THE IMPACT OF THE USE OF ACTIVE IMAGERY ON LABOR AND DELIVERY

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ON LABOR AND DELIVERY

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Abstract

This clinical investigation assessed the impact of the use of active imagery during labor and delivery to: assist in pain control, facilitate the physiological processes of labor, reduce anxiety, and improve feelings of control and self worth in the parents. Multiple designs including descriptive, Wilcoxon signed-rank test, and ANOVA using the General Linear Model were employed. After approval by monitoring authorities and informed consent, multipara couples responded to the State Trait Anxiety Inventory, the Pregnancy Attitude Index or Levenson's Locus of Control Scales, and the Adjective Checklist. Gender differences in the late third trimester were assessed. Experimental group couples were taught active imagery, given an audiotape for daily practice, and used imagery in labor and delivery. After delivery, tests were readministered, subjective comments recorded,and vividness of imagery assessed in the imagery group mothers.

In the 15 couples studied, all were Internally controlled. Men felt more Internally controlled, women more manipulation by Powerful Others. There were no differences on the STAI or ACL.

After delivery, no change was found on the STAI, or in Internal control. The eight couples in the Control group and women had greater control by Powerful Others. Control by Chance increased in the Control group particularly the women. On the ACL, the Experimental group had significant change in Favorable scores with more feelings of internal control, confidence and less need for support and sympathy compared to the Control group.

There was no significant difference in time in labor from 7-10 cm. However, Experimental group mothers had shorter labor periods in the hospital. They required less medication, their babies had higher one minute Apgar scores, and significantly higher arterial oxygen concentration in umbilical cord blood gas analysis. Subjectively, mothers voiced greater feelings of control after using imagery, adopting the procedure and generalizing it to other life situations.

This study provided an initial look at men's feelings during their wive's pregnancy. The use of active imagery resulted in greater feelings of control and self worth, shorter total labor periods and improved neonatal outcome in this group. Imagery offers a potential for improvement in the birth process which merits further study.

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Introduction

Rationale for the Study

No event in the human life-span has occasioned more concern than the birth of new life. Pregnancy, labor, and delivery have been the subject of ritual and authoritative pronouncement alike. Historically, how the parents experience this period and how the medical community should intervene has had many different perspectives.

Prior to four hundred years ago, although hampered by ignorance of asepsis and germ theory, birth was a more natural, holistic event. Labor was accomplished as a dynamic, supported process. The mother often walked in labor, delivered in an erect posture, and, most importantly, was helped by caring support persons. In 1783, Mauriceau introduced the supine position in labor as more suitable for the obstetrician (Poseiro et al., 1979). The mother became isolated from her family in her labor. An era of technological intervention took childbirth out of the home and into the delivery room. The extensive use of narcotics and anesthesia necessitated surgical assistance with forceps and scalpel. The father was relegated to an isolated waiting room to be informed of the birth after the fact, and the baby was whisked off to the sterility of the nursery. Recovery time for the mother was often a week to ten days. While maternal and fetal outcome benefited from technological innovation, bonding relationships suffered. Contact with the child was limited for the mother and almost nonexistent for the father.

In response to this, Dr. Grantly Dick-Read (1970) wrote Childbirth Without Fear, introducing a positive, natural approach to birth, to combat what he saw as the fear-tension-pain cycle. Dr. Fernand Lamaze adapted a Russian method of "mind-prevention" or psychoprophylaxis by incorporating breathing techniques, relaxation, and education to give the woman control and to reduce anxiety and, thus, pain. The procedure was based upon three Pavlovian propositions. First, a conditioned association between fear or pain and uterine contractions is a learned response which must be extinguished. Second, breathing patterns set up centers in the cerebral cortex which inhibit pain sensation. Third, verbal stimuli can be substituted as prime stimuli over painful ones (Wideman & Singer, 1984).

Drawing from these theories, current obstetrical practice seeks to educate the couple, reasoning that information reduces anxiety, while relaxation of the musculature and oxygenation of the baby are accomplished with breathing techniques (Ewy & Ewy, 1970). The ideal situation would have a relaxed, informed couple making use of the least intrusive technology possible.

Obstetric technology now functions to assist the parents and baby. The goals of intervention are to support the laboring couple, facilitate self esteem, and monitor maternal and fetal physiology. However, in the face of a more enlightened role for medical technology, labor management strategies have not been adequately validated or updated. Reports have not been sufficiently rigorous, being based on anecdotal records and self-report. Intervening variables such as demography have not been explained. Moreover, of the five parts of Lamaze: education, respiration, relaxation, cognitive restructuring, and social support, it is unclear which are effective and how they could be optimized

(Wideman & Singer, 1984). The underlying premise of the Lamaze technique is that of active involvement, while the mechanism is passive relaxation. Although espousing active participation, much of the mother's time spent in labor is devoted to trying not to act physically. The mother is still in the position of being acted upon. Although Lamaze techniques were among the first to use the mind to alter physiology, a more proactive role for the parents is possible. Geden, Beck, Hauge, and Pohlman (1984), describe a lack of empirical basis for Lamaze and propose that newer pain-coping strategies could improve labor's outcome. With a renewed appreciation of the interrelationship of mind and body, holistic health care offers an opportunity to mobilize the mind more fully in the service of the body. The purpose of this study was to further examine the use of one of these strategies, active imagery, in the labor and delivery process.

Research Questions

In order to address scientific validation, the following research questions directed the inquiry:

1. What is the relationship between gender and psychological status during pregnancy?

2. What is the relationship between coping strategies and the physiology and outcome of labor and delivery?

3. What is the relationship between coping strategies and the experience of pain in labor and delivery?

4. What is the relationship between coping strategies and the psychological status of the parents both before and after delivery?

5. What is the relationship between success in labor and delivery (by either subjective or objective criteria) and the mother's vividness of imagery?

Conceptual Framework

The underlying conceptual framework used is that of systems theory. Systems theory is a mechanism for analyzing a complex entity in light of its interacting parts and relationship to its environment (Gillies, 1989). Contact with any of these parts is expressed as change in the whole system. Furthermore, each system is an integrated part of a larger system. So that if a cell and its components are regarded as a system which changes and reacts to stimuli, the change in that cell as a part of a larger organ system affects that larger system. Likewise, the mind perceiving a stimulus reacts and influences the body system. So, a sensory stimulus is perceived in the brain impacting the central nervous system and through neuronal or humoral mechanisms affects the body tissues. This mind modulation of the body communicates through the autonomic nervous system, the endocrine system, the immune system, and the neuropeptide system. "Mind modulation is the natural process by which thoughts, feelings, attitudes, and emotions (or neural messages) are converted in the brain to neurohormonal messenger molecules and sent to all body systems" (Dossey, Guzzetta, & Kenner, 1992, p. 17).

The apperception of an event, whether it is sensed from outside the individual or due to an imagery event, affects the whole organism. The person, who is an integrated system composed of body, mind, and spirit, is impacted by the perceived event. Thus, physiologic changes stemming from the brain and

central nervous system are communicated to the cellular level by nerves and messaging systems (Groer, 1991). The mechanism of this information processing is direct from the cerebral cortex to limbic and hypothalamic systems, and thence to the body by means of the neurotransmitters, the endocrine hormones, and neuropeptides (Dossey et al., 1992). Imagery can change both physiology and psychology as components of the larger unity.

The concept of the "mental image" in the history of psychological thought has been pivotal, dictating the orientation of such dissenting schools of thought as those of Watson and Freud. The discussion of a single explanatory concept of imagery is hampered by the diversity of existing viewpoints. No one theory or model sufficiently explains this construct. For the purposes of this discussion, philosophically, non-material phenomena such as mental operations and "their neurological substrates are different aspects of a complex total reality...the double-aspect theory" (Holt, 1972, p. 6). This position views mental imagery as real and operant, one expression of a single actuality which is just as valid as biological events. In fact, imagery initiates, and is initiated by, biological events. Thus, the mind-body gap is bridged, with the organism's actions viewed from either a physiological perspective or a psychological one. The unity of the organism remains. The analogy can be made to a scene which appears different when viewed from various perspectives. It is understood that this division of reality into different theoretical constructs is arbitrary, a function of man's mind and a desire to compartmentalize. Therefore, the holistic opinion of man as a unitary system comprised of body, mind, and spirit, posits that man with his resources has the ability to experience imagery as a real event which, of

necessity, has an impact on his total being, and its physical, mental, and spiritual expressions.

Hypotheses

The central hypothesis is that the use of imagery will significantly alter the physiological progress of labor as evidenced by: a labor curve similar to, or faster than, Friedman's (1970) normal labor curve (a slope of 1.5 or greater in the active phase of multiparas); decreased need for medication as compared with the control group; improved fetal outcome as measured by Apgar score; and a decrease in vital signs, such as lower mean blood pressure and pulse in latent and active labor periods when compared with the control group.

A further hypothesis is that the use of imagery will alter the psychological response of the parents, as evidenced by increased feelings of control, decreased anxiety, and increased self-satisfaction as measured psychometrically.

Definition of Terms

Imagery. Imagery is "the internal experience of memories, dreams, fantasies, and visions. It may involve all of the senses and be thought of as the hypothetical bridge between the conscious processing of information and physiologic change" (Dossey et al., 1992, p. 29).

Locus of Control. Locus of control is the concept, introduced by Rotter (1966) and refined by Levenson (1972), that individuals do or do not have the

expectation of control over the events which affect them. Individuals with "Internal" control expectancies attempt to personally control their success or failure. Those with "External" control expectancies must have outside direction. People who feel controlled by "Chance" feel buffeted by fate (O'Connell, 1983; Stanley, Hyman, & Sharp, 1983).

Multipara. The term multipara refers to a woman who has experienced more than one pregnancy.

Dilatation. Dilatation is "opening of the cervix to allow for delivery" (Pillitteri, 1985, p.1242).

Friedman's Labor Curve. Friedman's labor curve is a graphic representation of labor progress in which hours of labor are plotted against cervical dilatation resulting in a characteristic curve (Friedman, 1970). See Appendix A.

Active labor. Active labor extends from approximately 4 centimeters (cm) dilation to delivery, and is usually marked by coordinated and effective contractions.

Apgar score. The Apgar score is the numerical determination of infant adaptation to extrauterine life, usually assessed at one and five minutes after birth. Scores of zero, one, or two are assigned to five categories: color, heart rate, respiratory effort, reflex, and muscle tone. The Apgar score is the summation of these scores and may range from zero to ten.

Assumptions

The following assumptions were operative in this study:

1. Instruments used were valid and reliable.

2. Subjects from all geographic locations were drawn from the same population.

3. Subjects used the imagery tool as they were instructed.

4. Subjects were truthful in their answers on psychometric testing instruments.

5. Pregnancy was not considered a disease state but a normal life occurrence. Responses to pregnancy, labor, and delivery were analogous to responses to other stressful life events.

Limitations

The following limitations were recognized:

1. Subjects formed a convenience sample.

2. Highly motivated, generally well informed, participants self-selected themselves.

3. Sample size was small.

4. There was a possibility of the operation of the "Hawthorne effect" or an altered response simply due to the effect of being studied.

5. The documentation of data in the medical records was not uniform between institutions and between subjects.

6. There was the historical confounding effect of a major stressful event, the Persian Gulf War. Because the sample was drawn from a military population which was mobilized, or was at risk for mobilization, to a war zone during the time period of the study, measures of anxiety could be altered in both the military member and the spouse. In addition, commitment to completing the questionnaires became a lower priority.

7. The imagery script was prepared as a clinical intervention and not tested for validity or reliability.

Summary

An opportunity to better use the resources of the expectant couple to realize the best outcome of their pregnancy existed. Incorporation of a more balanced psychological method of health care into the currently available medical labor and delivery care model offered the potential for a more satisfying and better outcome of the pregnancy.

Literature Review

> When an image became an obsession it pervaded the body, bound up the heart, clutched at the sinews and vessels, and directed the flesh according to its own inclination. (McMahon, 1976, p. 181)

Such was the place of imagery in ancient and Renaissance times. Man was viewed holistically, as a fusion of body and mind. Before Descartes' introduction of dualism philosophically blocked the interaction between mind and body and reduced medicine to the purely material level, images, "movements of the soul" (McMahon, 1976, p. 180), were the accepted causality of illness, and together with the patient's trust, the means of intervention.

The current conceptual orientation towards imagery has been marked by the historical consequences of this philosophical controversy. In the past fifteen years, theoretical explanations for the nature of imagery and its relationship with thought and memory have multiplied as the Watsonian disavowal of the concept has paled. However, the Cartesian rejection of a holistic mind-body interaction persists in the current practice of medicine (Guzzetta & Dossey, 1992, p. 12-13). "...We must believe that all the heat and all the motions which are in us, in so far as they do not depend at all on thought, belong only to the body." (Descartes, 1981, p. 20). Eisenberg et al., (1993) included imagery as one of the "unconventional therapies" which they defined as "medical interventions not taught widely at U. S. medical schools or generally available at U. S. hospitals" (p. 246).

Because the term "imagery" is used by many vastly different schools of thought, a discussion of what it is and what it is not, for the purposes of this study, is essential. Richardson (1983) has attempted to clarify the melange of theoretical models with classification into two outlooks: one views imagery as a nonphenomenal, inferred construct and the other sees it as an experiential phenomenon. The clinical uses of imagery found in this study employ the latter explanation.

Nonphenomenal Theory

In the Watsonian tradition, most behaviorists see imagery as a "ghost" outside the credible causes of human behavior. It is not routinely incorporated into theory or practice. Imagery, in this orientation, is viewed as an explanatory construct, often part of a model of information processing of memory or learning (Kieras, 1978). Currently, computer and machine language offer applicable paradigms for human data processing. A modern example of functionalist thought, Kosslyn (1988) described an array theory of visual information processing. This array was analogous to a computer memory whose configuration delineated the image. Analysis of human behavior during imagery exercises led him to hypotheses about imagery processes. One of these processes that Kosslyn's theory allowed for was mental transformation. Extensive research has been done on the ability to manipulate an image in the mind in order to problem solve in the real world, for example, getting an open card table through the kitchen door. This maneuvering ability has been used as a measurement of the ability to image. Richardson (1983) cautioned, however,

that tests of spatial manipulation were not valid tests of imagery abilities. Some spatial solutions derive from knowledge gained through other methods of data gathering. For example, answers to questions about images of horses may be derived from prior knowledge, not the actual use of imagery.

In the book, Wet Mind, Kosslyn and Koenig (1992) proposed a complex theory of brain/mind organization using positron emission tomography (PET) and Xenon-133 rCBF (regional cerebral blood flow) analyses, together with case studies of individuals with disease or damage to the brain. The authors designed a schematic representation of subsystems and connections within the brain using computational analysis. That is the "logical analysis of the information that is needed to produce a specific behavior" (Kosslyn & Koenig, 1992, p. 33). In this model, the authors deduced the existence of a visual buffer which was spatially organized in the brain. The outline of the visual image was demonstrated in the pattern of radioactive tracer found on autopsy of a monkey injected while focusing on a similar image. Analogous to a cathode-ray tube monitor, this visual buffer appeared to be activated in the operation of mental imagery also. While the authors' ambitious model has not sufficiently explained the operation of the brain/mind, their study of the operation of imagery has been intense. The operation of the image in the brain was seen as functioning in four ways: "to access information in memory, help one reason, learn new skills and aid in comprehension of verbal descriptions" (Kosslyn & Koenig, 1992, p. 129).

In criticism of this model, it attempts to explain the processing necessary to perform these behaviors. There are many problems in reducing the multidimensional operation of the brain/mind to either a two-dimensional graphic or a computer model. Analysis of thought and movement are often defined

a priori in terms of the analogy they are supposed to represent. Clinical correlations are carefully selected and discussed as explanations rather than as examples. This theoretical perspective is concerned with operation rather than events.

Historically, structuralists, such as Paivio, saw information processing as being accomplished by means of a dual cognitive code, composed of a verbal and a visual (imagery) code, thus making imagery a theoretical element (Richardson, 1983). The propositionalist, Pylyshyn, rejected any role for the experience of imaging and suggested a single code, a propositional network of abstract relationships about the information (Anderson, 1981; Sheikh & Kunzendorf, 1984).

Lang (1979) proposed a bio-informational organizational theory in which he demonstrated that image content could be shaped and thus change physiological status. With great precision, Lang, Kozak, Miller, Levin, and McLean (1980) have carefully described imagery in terms of measurable brain input and output. A role for the image as a phenomenon is acknowledged with attendant physiologic sequelae. These theoreticians have allowed for physical change due to imagery while espousing a functional model for its operation within the body of traditional psychology. Lang (1979) envisioned a single propositional abstract code for information, but believed that emotive imagery tied to semantic coding could result in the generation of a network which, with active participation, could produce a somato-visceral response. Mast (1986) saw this network theory as providing a unique explanation for the variety of physical, behavioral, and psychological changes occasioned by the use of imagery. Other theorists included biochemical and neural substrates in their

information management models. All these views shared the perspective that imagery is primarily a behavioral, explanatory construct, seeking to explicate the mechanism of the imagery process.

A slightly different perspective has been adopted by the cognitive neuroscientists, Johnson (1987) and Lakoff (1987). They described the role of imagery or image schemata which "operates at a level of mental organization that falls between abstract propositional structure, on the one side, and particular concrete images, on the other" (Johnson, 1987, p. 29). These schemata pattern or organize experience. They are seen as the format in which perception and reason are encoded (Lakoff, 1987).

Phenomenal Theory

Definition of Imagery

Any theory of a phenomenon is best outlined by the description and operation of that event. The phenomenon of imagery has been defined as a conscious experience that occurs without the real object necessarily present (Anderson, 1981). Imagery is conscious in that one is, or can choose to be, aware of it. It is not an unconscious, unavailable phenomenon. Experiences are either the result of stimulation of the senses (percepts) or exist without that stimulus (images). Imagery has often been defined as "quasi-perceptual" (Richardson, 1983, p. 150) or quasi-sensory conscious experience (Richardson, 1983). The "image" may be "seen" in the mind or through any other sensory modality: the image may be sensed as a smell, or felt, or tasted, or heard. The

terms "image" and "visualization" imply the visual sense, which led early psychologists, as well as present day observers to think in terms of photographs (Gardner, 1985). Strosahl and Ascough (1981) clearly rejected the "mental photograph" concept of the image as oversimplistic and inadequate for the multirepresentational operations which were being carried out. In addition, the activity of viewing a photograph suggests a distant, observer role, rather than a participatory one, a critical implication for clinical implementation. However, it remains easier in common usage to refer to an "image" rather than a "quasi-sensory event." In fact, multiple sensory modalities: visual, proprioceptive, auditory, kinesthetic, gustatory, olfactory, and tactile can enter into the imagery. Dossey (1988, p. 226) summarized: images relate to physiologic states either causatively or reactively, are induced by both conscious and subconscious states, and are the bridge between conscious processing and physiologic change influencing both voluntary and autonomic nervous systems. The basis of this study is that imagery is a real phenomenon which operates in practice. Speculation on the information processing or propositional nature of imagery is beyond the scope of this study.

History of the Clinical Uses of Imagery

The history of the use of imagery or visualization extends from before written history through shamanic legends to modern times. Lang (1979) described the role of imagery in altering physiology as early as the turn of the century in this country during research on the galvanic skin response. Leuner (1969) found that relaxation and suggested visualizations took his patients to a

meditative state where psychotherapy occurred in Guided Affective Imagery. From this work, the growing science of biofeedback made the theoretical leap from passive direction and information gathering, through imagery, to the control of physiologic processes. Di Giusto and Bond (1979) acknowledged that autonomic nervous system function could influence, and be influenced by, mental imagery. Their experiments systematized the experimental method of reliably testing the autonomic nervous system arousal occasioned by imagery. Melmed, Roth, Beer, and Edelstein (1986) wrote of a patient able to measurably alter peripheral vascular circulation through imagery. In their discussion, they recall Montaigne's insight that imagery and placebo are the reverse of symptoms produced by fearful, negative anticipation.

Classification

Imagery may be classified in several different ways. Active and passive imagery, also called therapeutic and diagnostic, can be differentiated (Achterberg, 1985). While there are components of both modes in many studies, one aspect usually predominates. Active imagery involves the conscious concentration on image formation (Guzzetta & Dossey, 1992). When these have a healing focus they are considered therapeutic. Images may also be classified as concrete or symbolic. They may be concerned with process, end state, or general healing (Dossey, 1991).

The passive, receptive, or diagnostic use of imagery involves an open availability to spontaneous images. This may serve to resolve conflicts, provide relaxation, or furnish information about the body. Earlier investigations

monitored the physiologic effects noted to occur when imagery material was introduced. The utilization of pleasant scenes to block noxious stimuli is in this tradition (Stone, Demchik-Stone, & Horan, 1977).

The active or therapeutic form of imagery is defined as the cognitive manipulation of the physical. The image is consciously shaped from a knowledge of physiology, desired change, or final state. Actual physical images or symbols can be used. Red blood cells could be seen joining with oxygen molecules and perfusing the heart, or sturdy timbers may be bolted across a broken bone to strengthen and buttress it. Burn graft acceptance (Achterberg & Lawlis, 1980), stress and hypertension control (Pelletier, 1977), psychoneuroimmunology (Groer, 1991), control of chronic pain and accompanying medication reduction (Sachs, Feuerstein, & Vitale, 1977), and cancer treatment (Achterberg & Lawlis, 1978; Simonton, Simonton, & Creighton, 1978) have all responded to the use of active imagery (Achterberg & Lawlis, 1978). Solomon, Amkraut, and Kasper (1974) have indicated that immunity, in part, can be a learned response, and thus subject to the control of conscious imagery. In fact, common experience in the eradication of warts by simply wishing them away has demonstrated the role of the cognitive modifying the physical (Achterberg, 1985).

Mental rehearsal is a form of active imagery. Olympic athletes have found that visualizing each physical move along with the attendant emotions and feelings not only reduced anxiety but provided a "subtle muscular workout" (Achterberg, 1985, p. 108). With emphasis on the process of mental rehearsal, the anticipated activity is repeatedly practiced. Extensive research in sports and physical therapy has proven it to be a credible therapeutic intervention (Suinn,

1983). One of Kosslyn and Koenig's (1992) operations of imagery, skill learning, is actually mental rehearsal.

Relaxation

Relaxation is a necessary prerequisite to imagery. The relaxed state focuses attention on the body's interior state. The relaxation response described by Benson (1975) includes a definite set of physiologic reactions also called the hypometabolic state. Oxygen consumption and carbon dioxide elimination are found to decrease with both gases remaining stable. Pulse and respiratory rate slow, and the person remains alert and open to imagery (Wallace & Benson, 1972). The physiologic reversal of the fight-or-flight response, this decreased sympathetic nervous activity allows the testing and proof of the ability to consciously control autonomic activity (Samuels & Samuels, 1975).

Imagery and Perception

Newer theories of cognitive neuroscience seek to identify neural substrates activated during mental exercise. Use of PET scanning to image areas of metabolic activity has shown activation of the visual spatial attention system in the posterior parietal lobe during visual imagery (Posner, Petersen, Fox, & Raichle, 1988). While the resemblance of imagery to perception would seem experientially self-evident, Finke (1985) related three types of theories (structural, functional, and interactive) which explained the relationship of imagery to perception. In an early study, Johnson (1982) reported "that

movements and imagery of movements were functionally equivalent" (p. 349). He had subjects insert an interpolated, new movement into the performance of a task; and likewise image the task and a new movement, producing the same bias for both groups. The imagery of movement is functionally the same as the perception of actually performing that movement. Sheehan (1966b) who studied the quality of vividness in an effort to quantify imagery, has found a functional similarity between skill at perceiving vividly and imaging vividly. Kosslyn and Koenig (1992) also found shared mechanisms between visual imagery and visual perception. "The same representations in the parietal lobe are used to direct actual actions and imagined actions, and so refining these representations in imagery will transfer to actual movements" (Kosslyn & Koenig, 1992, p. 156).

Imagery and Hypnosis

The underlying structure of directed relaxation (by self or others) and imagery is paralleled in hypnosis and imagery. For this reason, clinical research has sought to delineate areas of similarity. Hypnosis has been said to differ from imagery only in its pursuit of the trance state (Zahourek, 1988). Mitchell and Lundy (1986) demonstrated the efficacy of relaxation and imagery in the achievement of hypnosis independent of level of hypnotizability. Benson (1989) described the hypometabolic relaxation response which also occurs in hypnosis. In an effort to discover psychological correlates of hypnotizability, Nadon, Laurence, and Perry (1987) utilized stepwise discriminant analysis. Testing on nine non-hypnotic measures revealed that preference for an imagic style of thinking as measured by the Questionnaire Upon Mental Imagery (QMI)

correlated with hypnotizability. Although this method can underestimate underlying multivariate relationships it was preferred by the authors. Nilsson (1990) found that volunteers for a visual imagination study had significantly more vividness when told they were to experience hypnosis or relaxation. In a cognitive operation, a gestalt closure task, subjects who succeeded were found to be both good imagers and hypnotically susceptible (Wallace, 1990).

Clinical trials have also demonstrated imagery's power in hypnosis. Spanos, Stenstrom, and Johnston (1988) found wart loss in subjects who reported more vivid imagery despite non-significant scores on measures of vividness. Gastric acid secretion was modulated by hypnotic suggestion to imagine delicious food or relaxation (Klein & Spiegel, 1989). Interestingly, children were able to self-regulate the levels of immunoglobulin A in their saliva by self-hypnosis in what the authors call "cyberphysiology", or self-regulation (Olness, Culbert, & Uden, 1989). Sachs, Feuerstein, and Vitale (1977) studied chronic pain patients refractive to surgical and medical treatment. The use of hypnosis resulted in the reduction of pain severity, with a 61.25% average reduction in pain medication required, less sleep disturbance and interpersonal problems, and less distress. Finally, women in premature labor received hypnotic-relaxation tapes in which they were asked to imagine a relaxed uterus with a healthy baby delivered at term after a long pregnancy. They had significantly longer pregnancies and larger babies compared with a control group treated only pharmacologically (Omer, Friedlander, & Palti, 1986). As Mitchell and Lundy (1986) found, relaxation and imagery are the efficacious components of hypnosis.

Clinical Uses of Imagery

Many research studies have been conducted to investigate the uses of imagery in various clinical applications. Critical analysis of studies involving passive, active, and mental rehearsal facets of imagery follow.

Integumentary System. Acne vulgaris, associated with increased stress, was significantly improved in a treatment group which coupled biofeedback-mediated relaxation and active guided imagery. Thirty subjects had been matched by age, sex, and severity of acne and were equally divided into a medical treatment group, an attention group, or the biofeedback-imagery group. No significant improvement was noted in the other two groups. At a four week follow-up, seven who discontinued their imagery practice had increased severity of disease, while those who continued the imagery did not. This is an excellent supportive study, but its sample size was small and participants were exceedingly well motivated by report. Thus, generalizability to the larger population is limited (Hughes, Brown, Lawlis, & Fulton, 1983).

Horne, White, and Varigos (1989) reported the positive results of a small pilot study which used passive and active imagery together with other psychodynamic treatments in atopic eczema. Although imagery was seen as a valuable tool incorporated into the lives of the patients, its possible mediation of immunity was not recognized. This was due, in part, to the psychoanalytic etiology ascribed to the disease itself. Moreover, sufficient methodological controls were not in operation to adequately test the operation of imagery. Another small study of seven patients (two male, five female) with recurrent aphthous stomatitis assumed a relationship between "psychosocial variables"

and immune activity (Andrews & Hall, 1990, p. 527). In this well controlled study, the participants were taught to imagine their white blood cells healing their mouth ulcers in an archetypal example of active imagery. Success was found to be due to the influence of relaxation/imagery. Hypnotic susceptibility did not correlate with the successful reduction in number of ulcers. The only drawback to this study was its small convenience sample.

Immune Response. Smith, McKenzie, Marmer, and Steele (1985) described a woman who was able to alter her response to varicella zoster skin testing. Visualizing the redness around her skin test site shrinking, she was able to alternately become test negative and then return to positive in subsequent tests over time. Also, both delayed hypersensitivity and lymphocyte stimulation of immune response were changed. While this was only one individual, the scientific scrutiny afforded her case helped to show that the immune response could be impacted by the mind. This incorporates active imagery, mental rehearsal, and relaxation to effect cell-mediated immunity.

Wound Healing. Holden-Lund (1988) explored imagery's effect on autonomic nervous system arousal and wound healing by assigning 24 cholecystectomy patients to either a relaxation and guided imagery group or a rest (control) group. Postoperatively, the author found lower state anxiety on the State Trait Anxiety Inventory (STAI) test, lower urine cortisol level, and less wound redness in the imagery group. Visualization of the wound-healing process comprised the active exercise. Although this was a small group, it did appear to be representative of the cholecystectomy patients at the study institution.

Postoperative Recovery. Leja (1989) used guided imagery as the independent variable with a treatment group of five postoperative older adults who were told to mentally rehearse their first two days at home. Five individuals in a control group received routine discharge teaching. The dependent variable was a measure of depression which the author believed was indicative of anxiety and loss of control. The treatment group had lower depression scores one week after guided imagery, however, there was no significant difference in the two groups one week after discharge. The author attributed this to the small sample size and the measurement of depression only. Direct measurement of locus of control and anxiety may have been more revealing.

Breast Cancer. In a British study, Bridge, Benson, Pietroni, and Priest (1988) sought to reduce anxiety through passive relaxation and imagery, and to improve mood and depression in 139 women diagnosed with breast cancer. Subjects were randomly assigned to one of three groups: relaxation, relaxation and imagery, or control. Self-report scales revealed that relaxation plus imagery was the most effective intervention and that women in this group had an improvement in overall mood state over the treatment period. This was found to be more effective for women over 55, but no satisfactory explanation for this difference was found. Sensitivity of the depression and anxiety instrument used (the Leeds General Scale), may not have been acute enough to accurately measure these feelings.

End Stage Renal Disease. Horsburgh and Robinson (1989) described intervention with imagery in a single case study of an end stage renal disease patient. Their goal was to facilitate patient adjustment to the disease and treatment, and thus increase compliance and a positive feeling about self. This

was demonstrated in the case study. Further study with a larger sample is needed to validate imagery's efficacy across patients in this group where stamina may be low and cognitive abilities impaired.

Burns. In 149 patients with major burns requiring extensive dressing changes and debridement, Achterberg (1985) found that imagery and mental rehearsal significantly reduced muscle tension, use of pain medication, and sedation. Weinstein (1976) also related anecdotal experience with the successful use of imagery in thermally-injured children. In a programmed process script, Achterberg and Lawlis (1980) described burn graft adhesion with revascularization and glue. Progress was evaluated and the patients drew their imagery in a well defined protocol that was both therapeutic and provided scientific data. Criteria for scoring of the drawings were developed so that comparisons between patients could be made.

Breast Milk Production. Mothers of premature infants in neonatal intensive care units were taught guided relaxation and visual imagery to increase expressed milk production. Feher, Berger, Johnson, and Wilde (1989) postulated that imagery would help to overcome the negative effects of stress and anxiety on milk production. Thirty treatment and 25 control mothers participated. The imagery was passive and active and resulted in 63% greater milk production for the mothers using imagery. Moreover, there was 121% greater volume of milk in a subgroup of imagery mothers whose babies were more ill and on mechanical ventilation. Mean volume of milk was also found to positively correlate with the number of times the imagery tape was used before the sampling.

Sports Medicine. In a review of the use of imagery in sports medicine and physical therapy, Warner and McNeill (1988), concluded that mental imagery enhances performance, that muscle activation occurs during kinesthetic imagery, and that incorporation of mental practice together with physical practice offers a more effective program for expanding human potential. Riccio, Nelson, and Bush (1990) found that the use of an imagery script improved the exercise practice of 27 older women when tested in a counterbalanced design. The subjects found that the script added meaning to their activities. The authors felt that purpose was the cause of the better performance rather than a practice effect. Limitations of the design were evident in that order assignment appeared to result in fatigue for one group.

Fansler, Poff, and Shepard (1985) used "ideokinetic facilitation (IF)" to achieve 142% improvement in balance in a group of 36 elderly women. In addition to visualizing the performance of the task and the feel of the action, IF used intense, perfect images. The authors theorized that the use of IF with physical practice resulted in the better balance due to the kinesthetic feedback to the central nervous system. In comparison to two other groups, a control group and a relaxation group, the IF group had significant improvement over baseline, but not significant improvement when compared to the other two groups. Small sample size and the fact that the physical condition of the elderly tended to be less homogeneous contributed to the lack of significance found.

In a between-subjects design of 32 subjects (26 men and 6 women) learning to throw darts, Mendoza and Wichman (1978) found that mental practice improved performance. As predicted, those who did only physical practice performed the best, which the authors felt was due to immediate

physical feedback received by the subjects. Performance with mental practice alone was equivalent to combined mental and physical practice. Both of these groups performed significantly better than no practice at all. Mental rehearsal did improve physical performance in that mental practice did yield successful results. Because division into four groups dropped the sample size per intervention to eight, this small sample size could have been influenced by many intervening variables. This was an early study in this area. The popular press currently speaks of similar effects from mental practice most prominent in Olympic training.

Psychomotor Skills. Bachman (1990) studied whether imagery could be used as mental practice in recertification of CPR. The sample size of 22 was too limited to ascertain if there was a true difference between control and experimental groups. However, participants felt that the imagery practice was helpful. Similar responses were found when Speck (1990) assessed performance and anxiety in first semester nursing students learning injection technique. In a quasi-experimental post-test design, both experimental and control groups received classroom instruction and the treatment group also used an imagery tape. Anxiety was definitely reduced in the imagery group, but performance scores were indistinguishable between the two groups. Anxiety was scaled with the STAI scale. Performance times and performance scores, as well as Biodot stress dots, were measured. However, this study was compromised by its small size.

Pain. The occurrence of pain as a universal human experience has been extensively studied. Pain, in itself, bridges the body-mind gap and alternative therapies offer unique avenues for treatment. Herr and Mobily (1992) described

the gate theory, how pain can be diminished at four points: at the site, in the spinal cord, in the brain stem, and in the cortex. A Delphi study validated methods of pain intervention at these various levels and their content including "simple guided imagery". This was defined at a basic level which did not require specialized skill training (Mobily, Herr, & Kelley, 1993).

In an early study, Swinford (1987) studied a small convenience sample of surgical patients. In a matched-pair design, the experimental group was assessed preoperatively and taught relaxation and positive imagery. Tape player and headphones were left with the patients. All participants were evaluated on the three days following surgery. The imagery group evidenced lower pain reports on the first post-operative day (approaching significance). This was a convenience sample and the size was small. Analgesic use could not be compared due to procedural difficulties. Replication with control of types of surgery, true randomization to treatment groups, and a larger sample size would offer more generalizable data.

Daake and Gueldner (1989) based a study on the Gate Control Theory of pain. They stated that imagery closes the gate opened by centrally acting factors such as anxiety, thus preventing sensory transmission of pain. Their experimental study of 32 post-operative subjects, half of whom used pleasant imagery, found that the experimental group had lower scores on a visual analogue scale of pain and used significantly less medication. The study was small, limited to gynecological and urological surgery, and composed primarily of women.

A multiple case study design of 14 children experiencing painful procedures in cancer treatment found that both children's report of pain and maternal

distress decreased over time (an 8-12 month period) with the use of distraction and imagery. Children found the procedures no less frightening (Broome, Lillis, McGahee, & Bates, 1992). Although this study had a small sample size, practice in imagery positively affected reported pain. The study was limited by the lack of assessment of adherence to imagery practice.

In a large pre- and post-treatment study of various coping mechanisms in the face of cold pressor pain, Devine and Spanos (1990) found that all strategies (nonimaginal reinterpretation, imaginal reinterpretation, nonimaginal distraction, and imaginal distraction) reduced pain perception better than non-cognitive activities. However, all the cognitive strategies represent imagery in some format whether a "picture" is presented or not (Fernandez, 1986). Thus, the study is supportive of imagery in its fullest sense.

Imagery has proven effective in many clinical applications across the medical spectrum. In evaluation of the research, studies have usually been small in size. Compared with other therapies, the number of studies are modest and are scattered across the past twenty years. The sparsity and persistence of the studies are probably a reflection of their non-technological nature and the lack of adoption by the medical profession.

The Experience of Pregnancy, Labor and Delivery

As stated in the assumptions, the experience of pregnancy is viewed as a normal occurrence. Although pregnancy is a stressful happening, influenced by situation and anxiety, as are all milestones in the developmental lifespan, to view pregnancy as pathological reflects an anti-female bias incompatible with a

holistic viewpoint of humankind. Current thought in the United States reflects a less liberated attitude towards women in general. Some of this ingrained perspective is evident in these research articles and must be taken into account in their evaluation.

Martin (1984) did a metaphorical analysis of the perspective of pregnancy, labor, and delivery in the United States. Women routinely felt "acted upon". Labor was an outside influence. Lamaze texts often referred to the passivity of the woman. "Uterine contractions are involuntary" (Martin, 1984, p. 1203). She found that obstetrical texts, for the most part, acknowledged no involvement of the woman's state of mind, although fear, anxiety, and pain can prolong labor. Martin (1984) felt that a more holistic image of the individual would empower women in the active role in their labor. Lederman, Lederman, Work, and McCann (1985) in a study of 73 multiparous women found that duration of labor was related to epinephrine and norepinephrine levels which were indicative of stress and anxiety. In addition, placental circulation and blood flow to the child was compromised by high levels of catecholamines. Almost 40 years ago, Bickers (1956) described the reaction of the smooth muscles of the uterus to autonomic innervation and humoral elements. Tension was shown to cause dysrhythmic contractions on uterogram. Wuitchik, Lipshitz, and Bakal (1989) found that the prolongation of labor and fetal complications due to cognitive stress were independent of pain. In a review of the literature studying stress and antepartal and intrapartal complications, Levin and DeFrank (1988) found that life events and anxiety correlated with antepartum complications. These varied widely in type and severity from fetal demise to breast abscess. Correlation with intrapartum complication was weak and many methodological problems existed.

They found that pregnancy was impacted by cognitive distress, anxiety, and change in feelings of control, all of which could be influenced by the intervention of caregivers. But, the research did not adequately define "complication" or take into account the presence of pre-existing stress and anxiety.

Lamaze

Lamaze is the principle non-invasive intervention in the birthing process. Felton and Segelman (1978) analyzed feelings of control in 62 women who were divided into three groups: those who had taken Lamaze classes, Red Cross classes, and no classes. Scores on the Rotter (1966) Internal-External (I-E) Scale disclosed that women who had Lamaze training felt more internal control after the birth. This study addressed the idea that increased feelings of control in the mother might be associated with a better pregnancy outcome. Hughey, McElin, and Young (1978) matched 1,000 women for age, parity, and educational level. Those who had Lamaze training had one-fifth the amount of fetal distress, one-fourth the number of cesarean sections, and one-third the number of infections when compared to untrained women. This early study offered no explanation of the mechanism behind these results. As exploratory research, this large investigation represents the initial effort to assess the safety and efficacy of Lamaze.

Samko and Shoenfeld (1975) found that there was no relationship between hypnotic susceptibility and success in Lamaze as measured by level of consciousness, attitude, physician's rating of "success," and physician's rating of how helpful Lamaze was to the mother. Forty-seven percent of the mothers had

received tranquilizers or sedatives, 7% "twilight sleep," and 7% general anesthesia. While this reflects obstetric practice current to that time, the quality of Lamaze practiced while the mother is unconscious is suspect, and the physician's assessment of maternal success may reflect physician convenience. The mothers' opinions could have been more thoroughly investigated while evaluating "success".

Stevens and Heide (1977) compared "prepared childbirth strategies" with distraction and systematic relaxation in coping with analogued, or simulated, labor pain. They found prepared childbirth strategies more effective. However, ice water induced pain had neither the emotional implications nor physiologic complexity of true labor. One does not bond with an ice cube.

In a more appropriate cold-pressor test, Stone et al., (1977) examined two components of Lamaze: focal-point visualization and respiratory control, and in-vivo emotive imagery. The only significantly effective coping mechanism was the imagery. Analogued labor pain, some pain stimulus patterned to resemble labor pain, is frequently used in pain coping studies because "a number of factors make it difficult, if not impossible, to investigate these issues within a clinical childbirth context" (Geden et al., 1984, p. 261).

In an extensive review and critique of the prepared childbirth literature, Beck and Siegel (1980) detected little significant interplay with current psychosomatic research. They found analogued studies had statistical and methodological faults and no studies had internal validity. "Very little of the literature addresses how, why, or even if these methods are effective" stated Wideman and Singer (1984, p. 1357). They called for investigation of the best methods of pain relief and anxiety reduction in labor to be scientifically validated.

In a more recent study, Leventhal, Leventhal, Shacham, and Easterling (1989) attempted to answer this with an evaluation of Lamaze participation and the monitoring of sensation. Results showed that both attendance at Lamaze classes and monitoring of contractions reduced pain and distress in stage two of labor. As the authors stated, however, the active pushing of stage two not only signifies progress and nearing completion, but allows the mother to have control of her actions.

Hypnosis was compared to Lamaze by Weishaar (1986) who found Lamaze to be more effort. Unfortunately, this was a self-report and single-case study typical of this era. Fee and Reilley (1982) reviewed procedures using hypnosis in labor. Finding many forms they stated "it is currently impossible to distinguish between obstetrical hypnosis and antenatal childbirth training" (p.17). This appears to be an oversimplification. It is noted that all the references were from 1958 to 1972, while Lamaze did not enter into widespread practice until the early 1980's.

Self-efficacy and outcome expectancies were analyzed in view of their ability to predict control of pain in labor (Manning & Wright, 1983). The mothers' predictions of medication use and their confidence that pain control would be effective were compared with actual experiences after labor. The results for the 52 primiparas confirmed the contention that both expectancies predicted pain control. However, the expectancies did not differentiate one from the other. The researchers were more interested in the control mechanisms than the labor setting. Self-efficacy expectancy is considered one of the possible mechanisms of success in prepared childbirth. The study is supportive of the role of internal locus of control in labor.

Imagery in childbirth

There are very few examples of the use of imagery in childbirth. In the first modern report, Horan (1973) described the use of "in-vivo" emotive imagery with his wife's labor. Impressed with the technique, he carried out further study on imagery. Geden et al., (1984) offered 100 nulliparous women undergoing analogued labor pain one of five pain-coping strategies. Relaxation training, pleasant imagery, sensory transformation, neutral imagery, and combined (the last three) strategies were used to reduce pain. Physiologic parameters proved inconclusive. Subject's self-report found sensory transformation helpful. Sensory transformation was defined as having the subject concentrate on the pain and to imagine it turning into a warm, pleasurable sensation. This is also a use of imagery, in this case, tactile rather than visual.

Geden, Lower, Beattie, and Beck (1989) offered strategies to cope with analogued labor pain with 50 nulliparous women. Response to different types of music did not differ from control groups' responses but subjects reported using imagery independently. In a second experiment, music was paired with imagery resulting in no significant differences. The authors indicated the inadequacy of the analogued pain replicating true labor. They pointed out that subjects who were asked to use their own imagery reported less pain, although this was not statistically significant. The power and complexity of the labor experience was not present. Participants knew that they could withdraw at any time. In addition, the within-groups sample size was not sufficient to provide statistical significance.

Rees (1992) used imagery for mental rehearsal with first-time mothers to improve anxiety, depression, and self-esteem. The author stated that imagery was effective and presented a protocol for intervention. No research was done, this was a review of the literature and a proposed teaching framework without any supporting data.

Peterson (1981) and Peterson and Mehl (1984) have used "multi-sensory visualization" to take pregnant women through the birth process rehearsal to actualize their own resources. Active imagery involved the individual in exploring "inner space". In a relaxed state, the physiologic process was observed, rehearsed, and manipulated. This provided a "response...incompatible with anxiety and lack of self-control" (Weinstein, 1976, p. 481). Intervention in labor and delivery to reduce pain and anxiety has a sound physiologic basis in preventing prolongation of labor and compromise of fetal oxygenation (Bickers, 1956; Martin, 1984). Traditional mechanisms of intervention, such as "prepared childbirth," while an improvement, leave mothers in a passive and dependent role. Current psychological advances in cognitive therapy have not been tested in this arena and, in fact, most literature is anecdotal.

Summary

To review the literature in terms of the research questions, first, what is the relationship between gender and psychological status during and after pregnancy? As described, prior studies of the implications of the mother's psychological state on pregnancy were dated and disorganized (Beck & Siegal, 1980; Levin & DeFrank, 1988; Martin, 1984). No research was found which

described the father's psychological state during the period of pregnancy. The present investigation assessed both parents' psychological status and compared their responses.

Second, what is the relationship between coping strategies and the physiology and outcome of labor and delivery? In assessing the coping strategy of active imagery, the literature revealed an extensive history of the use of imagery and several theoretical perspectives on its makeup. For the purposes of this investigation, the operant phenomenal definition of imagery as an internal experience which impinges on the central nervous system and by neural and humoral mediators changes the physiology at the cellular level was used. Stephens (1993) called imagery "a communication mechanism among perception, emotion and bodily change" (p. 170). The functional equivalence of imagery to perception and the action of imagery in hypnosis linked with clinical research offered bases for the idea that imagery can affect the progress of labor. In imagery studies, a review of 17 representative research analyses found most to have been successful in the clinical objective, but a majority of them were hampered by small sample size. Controls were often lacking and designs did not adequately take into account the variables measured. But, as Dossey (1993) stated, " there is ample solid scientific evidence that directed, highly specific imagery can bring about changes in the body" (p. 105). Omer et al., (1986) were able to prevent premature labor with imagery. Studies supported the role of stress and anxiety in affecting the duration of labor and placental circulation (Bickers, 1956; Lederman et al., 1985; Wuitchik et al., 1989). The only research linking imagery and labor used analogue pain in a non-pregnant population (Geden et al., 1984; Geden et al., 1989; Stone et al., 1977). Although current

Lamaze classes now incorporate more aspects of imagery, there is no literature other than Peterson and Mehl's (1984) work to provide structure. Prepared childbirth strategies have not been adequately studied or applied. The purpose of this investigation was to examine the use of active imagery and mental rehearsal in a controlled study of actual labor for the optimization of the labor process and physiologic change. The duration of labor, level of maternal vital signs, Apgar score of the baby, and values of the baby's cord blood gases were used as outcome measures after the use or non-use of imagery.

Third, what is the relationship between coping strategies and the experience of pain in labor? As outlined in the review, imagery has been effective in the control of pain (Achterberg, 1985; Broome et al.,1992; Daake & Gueldner, 1989; Devine & Spanos, 1990; Sachs et al., 1977; Stone et al., 1977; Swinford, 1987). This is perhaps the most universally accepted use of imagery. The Acute Pain Management Guideline Panel (1992) cites imagery as "effective for reduction of mild to moderate pain " (p.106). The present study examined use of medication in labor and subjective report of subjects to assess effectiveness of pain relief.

Fourth, what is the relationship between coping strategies and the psychological status of the parents both before and after delivery? Research found imagery as effective in improving mood, relieving anxiety, and improving feelings of control in adults (Bridge et al., 1988; Feher et al., 1989; Holden-Lund, 1988; Horsburgh & Robinson, 1989; Speck,1990). This investigation examined the psychological status of both the mother and father in labor and delivery and the effect of imagery on that status.

Finally, what is the relationship between success in labor and delivery (by either subjective or objective criteria) and the mother's vividness of imagery? There are conflicting studies on whether vividness is an accurate measure of the operation of imagery (Nadon et al., 1987; Nilsson, 1990; Sheehan, 1966a, 1966b; Spanos et al., 1988). This study attempted to further data collection on this subject by assessing the vividness of the imagery in the experimental group mothers.

Method

In order to examine the use of imagery for the relief of pain, the enhancement of the progress of labor, and impact on psychological status, a two group pre-post design was used which was analyzed using the General Linear Model analysis of variance for repeated measures. The psychological status of both the mother and father during the prenatal period was compared using the Wilcoxon signed-rank test for matched pairs.

Population and Sample

Couples expecting their second or third child comprised the population for this study. A convenience sample of 16 couples agreed to form the sample for the research. The participants were drawn from participating physicians' clinics at two large military hospitals. These settings were chosen because they both served the same military population. Expectant couples were free to choose either hospital for their prenatal care and delivery. In addition, one couple with similar demographics was included from a private physician's practice.

The following criteria described the couples in the sample:

1. Assessment of prenatal risk factors (such as diabetes, hypertension, incompetent cervix, history of pre-term labor) did not predict complications.
2. The mother was not scheduled for an operative delivery.

3. On the basis of this psychological testing, no psychopathology was exhibited.
4. There was no evidence of drug or alcohol abuse by chart review.
5. Hospital delivery was anticipated in the San Antonio area.
6. Physician permission was granted.
7. Informed consent and the right to withdraw forms were completed.
8. The pregnancy was of at least twenty-six weeks duration.

All individuals classified themselves as "Caucasian" except one mother who stated that she was Asian. All subjects came from varied cultural backgrounds. Of the 16 couples formally enrolled in the study, two couples did not complete it. One couple did not participate in the experimental portion of the study when their child was found to be in breech position and required a cesarean section. A second couple did not deliver at the planned hospital, and efforts to locate them through military locator systems have failed. The remaining 14 couples are described in Table 1. All but one couple were in the military (36% officers, 64% enlisted). Of the 28 individuals, 43% practiced a health-related occupation including medical technician, nurse, physician, or dentist. This sample was not specifically recruited from the general population. All were high school graduates with some college or military school.

Setting and Subject Selection

The study was introduced to the subjects and to the physicians, nurses, and childbirth educators by means of presentations describing the concept of

Table 1

Characteristics of the Sample

Variable	Range	Mean	SD
Maternal age	24-38 years	29.5 years	4.35
Paternal age	24-40 years	31.6 years	5.14
Prior children	1-2	1.67	0.78

Note. N = 28 individuals

imagery and the structure of the design. Posters were placed in clinic waiting rooms. Also, 2,500 prenatal records were reviewed and approximately 250 couples satisfying the criteria were contacted by telephone by the investigator.

Protection of Human Subjects

The Department of Health and Human Services, the National Institutes of Health, and the Office for Protection from Research Risks have implemented the National Research Act of 1974 by means of the Code of Federal Regulations, 45 CFR 46. This has become the standard of protection for human subjects involved in research. Certain protected groups are the subjects of detailed regulations: fetuses, pregnant women, prisoners, and children.

Pregnant women can be used as research subjects only if "the purpose of the activity is to meet the health needs of the mother and the fetus will be placed at risk only to the extent necessary to meet such needs, or the risk to the fetus is minimal" (OPRR, 1983, p. 13). Moreover, the mother must sign an informed consent form and be provided a copy. The Regulations define minimal risk as "the risks of harm anticipated in the proposed research are not greater, considering probability and magnitude, than those encountered in daily life or during the performance of routine physical of psychological examinations or tests." (45 CFR 46.102) The information obtained through testing and the medical record must be recorded so that subjects cannot be identified. And finally, the informed consent must discuss risks and benefits, the anonymity or confidentiality of the information, who to contact for questions, and a statement that involvement is voluntary and does not affect the reception of medical care.

The mothers participated in this study while meeting medical needs for pre-natal care. The interviewing and psychological testing presented only the "risk" of intrusion on privacy. This was minimized with careful coding of results so that individuals were not identifiable. The use of imagery has as its premise the exercise of maternal control. When the mother was properly instructed in and used imagery, it represented no more, and probably less, risk to mother and baby than unprepared childbirth. The consent forms (Appendix B, C, and D) incorporated the required statements and the requirements of the hospitals caring for the parents. Human subjects approval was obtained through the Institutional Review Board of the University of Texas Health Science Center at San Antonio where the investigator was employed, the University of Alaska Fairbanks, Wilford Hall Medical Center, Brooke Army Medical Center, the Surgeon General of the Army, and the Surgeon General of the Air Force.

Threats to Internal Validity

The primary investigator explained the design and elicited participation, obtained informed consent, instructed couples in imagery, and collected all data. There was no concern for bias associated with more than one investigator.

Polit and Hungler (1989) describe internal validity as the extent to which the effects on the dependent variable are due to the independent variable and not extraneous variables. As was noted in the limitations, history was the major threat which was operant. Using stress testing scales in a military population at the outbreak of war, introduced the possibility of confounding. Selection is a threat which was addressed by random assignment to control and experimental

groups. Although this was a convenience sample, both groups were equivalent, solicited from the same population with equal access to either hospital. Maturation during progress of the study was actually a function of the experience of pregnancy itself. Attrition occurred when one couple was lost to the study when they did not deliver at the hospital as planned and one couple had to have an operative delivery.

Threats to External Validity

External validity is defined as the generalizability of the study to other samples. This was a major threat due to the small sample size and the apparent self-selection by persons with a health care background. Although prospective subjects were from various occupations, all but one of the couples who joined the study were themselves physicians, nurses, dentists, technicians, or had close ties to health-care personnel. So they actually formed a subset of the general population.

Instrumentation

The independent variable in this investigation was the imagery script which was mastered onto an audiotape, copied, and given to the subjects. The instrument was prepared by the author as the clinical intervention and was not specifically tested for validity or reliability. The following principles were followed in its construction. Imagery has been found to work equally well for all ages (Kosslyn, Margolis, Barrett, Goldknopf, & Daly, 1990; Pierce & Storandt, 1987).

The script was created to appeal to both cerebral hemispheres with tonality and phrasing addressing the right hemisphere and content addressing the left (Peterson & Mehl, 1984). Various communication techniques, such as the use of truisms, statements believed to be true with a suggestion coupled to it; interspersal, causing words or phrases to stand out due to differences in tone or texture; and metaphors specific to the group's common situation were utilized to structure the script (Peterson & Mehl, 1984). The bi-directional control procedure (Di Giusto & Bond, 1979) addressed the problem of providing relevant images for all individuals. Alternative images were suggested to allow the person to respond to those which were appropriate at the time.

The imagery script consisted of an initial relaxation exercise followed by a mental rehearsal of the labor process ending with the caution that the child was not ready to be born and would come when it was time. Instructions for the father allowed him to visualize the child through a "window" into the womb. This incorporated active, mental rehearsal which used concrete images to achieve both process and end state. Some components of diagnostic, receptive imagery were present. The script can be found in Appendix E.

Dependent variables were assessed with the following instruments which will be discussed in detail in individual sections later: the State Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970), the Adjective Checklist (ACL) (Gough & Heilbrun, 1965), Levenson's Locus of Control scale (Levenson, 1972), the Pregnancy Attitude Index (PAI) (O'Connell, 1983), and the Questionnaire Upon Mental Imagery (QMI) (Sheehan, 1967b). In addition, measurements of pulse, blood pressure, length of time in labor, pain medication

use, and Apgar score were recorded. Analyses of blood gas samples from the infants' umbilical cords were conducted.

Design and Procedure

Potential subjects were contacted by the investigator in an unstructured interview to determine expectations and willingness to participate. Consultation with the physician was sought as to the suitability of couple's inclusion in the study. A written statement of permission was obtained from the physician (Appendix F). Physiological screening consisted of the history and physical examination and the plan of care predicting the potential for an uncomplicated delivery. The pregnancy was at least 26 weeks gestation ± one week when subjects were enrolled. Informed consent/right to withdraw forms were signed and witnessed (Appendixes B, C, & D). Both parents were asked to complete the State Trait Anxiety Inventory (STAI) and the Adjective Checklist (ACL). The mother was also asked to fill out the Pregnancy Attitude Index (PAI) and the father was asked to complete Levenson's (1972) Locus of Control instrument.

Six couples were randomly assigned to the imagery group. They were oriented to the use of the imagery tape by the investigator and any questions were answered. They were asked to use the tape at home on a daily basis, keeping a log of their practice noting the time spent, results, and any comments. This served to aid in compliance.

Practice is necessary to learn and continue the technique effectively (Hughes et al., 1983). On tape, both the mother and the father were escorted in a relaxed state through the birth process. Periodic telephone calls reminded and

prompted compliance and demonstrated concern for the couple. When the couple came into the hospital in labor, they were identified on the prenatal chart which accompanied them as participants in the study. The labor and delivery staff, together with the physician, were supportive of the couple's effort, but maintenance of the visualization was the responsibility of the couple themselves.

The eight couples in the control group completed the psychological testing and the labor and delivery process without imagery intervention. Both the control group and the six couples in the experimental group were free to use medications for pain relief, including epidural anesthesia. A record was maintained of pharmacologic assistance.

After the birth, the investigator collected data from the inpatient medical charts of the participants. For both groups, the progress of dilatation over time was charted on the graph developed by Friedman (1970) (see Appendix A). Apgar scores, maternal blood pressure, and pulse rate, as well as frequency and quantity of pain medication were ascertained from the medical record. The post-delivery instruments, STAI, ACL, PAI, and Locus of Control scales were administered again in the same manner as before. The Questionnaire Upon Mental Imagery (QMI) was administered to assess the vividness of the imagery of the mothers in the experimental group. These written instruments were delivered and returned by mail. Finally, a postpartum interview conducted by the investigator of both the mother and the father determined their subjective assessment of the birth experience and the efficacy of the imagery tool.

Data Analyses and Graphical Representation

Gender differences on psychological test responses were analyzed by the Wilcoxon Signed-Rank test (Daniel, 1990), using Minitab Release 9.1 (1992). The pre- post responses to psychological tests were analyzed via the General Linear Model analysis of variance for repeated measures, treating couple as a blocking factor, using SAS/STAT (1990). Excel Version 4.0 (1992) software was used for the analysis of t-tests for independent means of the Apgar scores; one way analyses of variance of maternal blood pressure, pulse, and dilatation; and all descriptive statistics. Umbilical cord blood gases were analyzed using t-tests for independent means and SYSTAT (Wilkinson, 1990). The graphs were constructed with Harvard Graphics for Windows Version 1.02 (1992).

Psychological Studies

Very little work has been done to describe the psychological status of both members of the expectant couple. While research has been undertaken relating to the mother, the influence of gender bias has caused science to overlook the father. In order to examine this population, the responses of the fathers were assessed and compared to those of the mothers on the STAI, locus of control scales (Levenson's scales and the PAI), and the ACL to address the first research question: "What is the relationship between gender and psychological status during pregnancy?

State Trait Anxiety Inventory

The State Trait Anxiety Inventory (STAI) (Spielberger et al., 1970) has been considered one of the best measures of anxiety (Dreger, 1978). The respondent is asked to choose on a five-point Likert scale the degree of anxiety experienced in a particular situation (State) with 20 State Anxiety items, and then the degree of Trait anxiety felt on 20 Trait Anxiety items. Score responses range from 20-39 (low), 40-59 (moderate) to 60-90 (high anxiety) (Spielberger et al., 1970). This test has a concurrent validity of 0.80 with the Taylor Manifest Anxiety Scale (Spielberger et al., 1970).

Purpose

The purpose of this first research question was descriptive. The responses of the men and the women were compared on both the State and Trait scales of the STAI to distinguish differences related to gender.

Hypotheses

Ho-1: There is no difference in anxiety as measured by the STAI between expectant mothers or fathers in the last trimester of pregnancy.

Ha-1: There is a difference in anxiety as measured by the STAI between expectant mothers and fathers in the last trimester of pregnancy.

Method

Subjects. The subjects tested were the 15 couples who originally started the study.

Design. The design sought to determine if there was a relationship between gender and responses on the STAI. The Wilcoxon signed-ranks procedure tested the matched pairs, the couples, by assigning ranks and determining difference between the two samples.

Procedure. Each couple was asked to complete the STAI. This was accomplished 2-4 weeks before delivery. This time frame was chosen due to the

accessibility of the mothers and fathers. Responses on the STAI were compared with the Wilcoxon signed-ranks tests for matched pairs using Minitab Release 9.1 (Minitab, 1992). Descriptive statistics of the raw data were derived using Excel Version 4.0 (Microsoft, 1992). An alpha level of 0.05 was used for the statistical tests.

Results

Differences between men and women on the STAI are outlined in Table 2. No significant differences were found between men and women in State anxiety or in Trait anxiety. However, women reported higher anxiety values, although all means were in the low anxiety range. All but one individual had percentile rankings within the low range. (One mother had an extremely elevated State anxiety assessment and a moderately elevated Trait level.) This person was not excluded since no behavioral evidence of this anxiety was shown. The overall values of the mother's group would seem to represent a tendency toward a general behavioral anxiety, one which should be viewed with some skepticism in such a small sample. One couple neglected to complete the Trait portion on the reverse side of the questionnaire resulting in unequal numbers of subjects, 15 sets of responses to State, 14 sets of responses to Trait.

Table 2

Gender Difference on the State Trait Anxiety Inventory (STAI)

Variable	men	women		
State	M = 30.20	M = 34.20	T = 1.00	df =26
Scores	SD = 6.13	SD = 10.64	p = 0.33	
	n = 15	n = 15		
Trait	M = 31.36	M = 35.57	T = 1.91	df =24
Scores	SD = 4.65	SD = 7.12	p = 0.07	
	n = 14	n = 14		

Discussion

Generalizations about greater levels of anxiety in women cannot be made from this data. The fact that the mothers had state anxiety is consistent with the developmental task in which they were involved. The statistical results that both fathers and mothers in this sample had similar and non-pathological scores for both State and Trait anxiety serves as a baseline to view the psychological reaction to pregnancy. Increasing the power of the analysis by inclusion of more subjects in this group would have yielded a stronger result.

Locus of Control Scales

A pivotal component of this study is locus of control. The opportunity to use imagery to influence physiology is the logical expression of internal control. Levenson (1972) developed the locus of control scales by adapting Rotter's (1966) scales measuring locus of control. The measurement of locus of control is seen as a "bridge between social, cognitive, and learning theory approaches to human behavior" (Stanley et al., 1983, p. 824). Each subject rated 24 items on a six-point Likert scale which ranges from strongly agree to strongly disagree. These responses were scored on three scales: Internal scale, Powerful Others scale, and Chance scale. The results of the scoring represent the person's attitude toward the amount and source of control over life events. Reliability of 0.71-0.77 alpha (Cronbach's alpha) was reported by Levenson and Miller (1976) (cited in Lumpkin, 1988). Internal consistency of individual scales were found to

be reliable at r = 0.67 for Internal, r = 0.73 for Powerful Others, and r = 0.80 for Chance (Blau, 1984).

The Pregnancy Attitude Index (PAI) (O'Connell, 1983), structured and scored exactly the same as Levenson's locus of control instrument, is a tool specific to parturition. The PAI correlated with Levenson's Internal scale ($r = 0.61$, $p < 0.001$), Powerful Others scale ($r = 0.36$, $p = 0.016$) and Chance scale ($r = 0.66$, $p < 0.001$). Issues specific to the concerns and work of pregnancy have been substituted for the original statements of Levenson (1972), much as he updated Rotter (1966). Results may distinguish experimental group participants or may show change over time (O'Connell, 1983). The drawback of this instrument is its validation with primiparae (women having their first children) only.

Purpose

The purpose of this first research question was exploratory. The responses on locus of control scales of the men and the women were compared to discover differences related to gender using the Wilcoxon signed-ranks test.

Hypotheses

Ho-2: There is no difference in locus of control scales between expectant mothers and fathers in the last trimester of pregnancy.

Ha-2: There is a difference in locus of control scales between expectant mothers and fathers in the last trimester of pregnancy.

Method

Subjects. The subjects tested were the 15 couples who originally entered into the study.

Design. The design of this section sought to determine if there was a relationship between gender and responses to the three scales of Locus of Control using the Wilcoxon signed-ranks test.

Procedure. Locus of control scales were completed 2-4 weeks before delivery along with the STAI. Responses of the men on Levenson's (1972) locus of control scales and of the women on the PAI were hand scored and then analyzed with the Wilcoxon signed-ranks test for matched pairs using Minitab Release 9.1 (Minitab, 1992). All descriptive statistics on the raw data, as seen in Table 3 were analyzed using Excel 4.0 (Microsoft, 1992). The alpha level for all tests was 0.05.

Results

Both men and women were found to have high Internal control with scores well above the mean of 24, and responses below the mean for both Powerful Others and Chance scales, see Table 3. The responses of the genders were found to vary significantly in the Internal scale and Powerful Others scales. The Internal scale is a measure of the subjects' estimation of the amount of personal control they exert over their own lives. Men expressed a

Table 3

Gender Differences in Locus of Control Scales

Variable	men [a]	women [a]		
Internal	M = 39.87	M = 33.07	T = 4.11	df = 27
	SD = 3.87	SD = 5.28	p < 0.001	
Powerful	M = 14.40	M = 22.33	T = -2.67	df = 27
Others	SD = 6.64	SD = 9.85	p = 0.01	
Chance	M = 12.53	M = 15.13	T = -1.07	df = 27
	SD = 7.36	SD = 7.90	p = 0.30	

[a] n = 15 for each group

greater feeling of internal control than the women. Contrariwise, women expressed increased feelings of manipulation by powerful others, perhaps a not unexpected state in pregnancy in an environment of socialized medicine, as all but one were seen in military clinics. Chance was not significantly different between the mothers and fathers. In summary, significant differences between the sexes were found in feelings of control, with men more internally motivated than women and women feeling more controlled by powerful others than men.

Discussion

Since a statistically significant difference between the means of the men and women in this study on both the Internal and Powerful others scales was found, the power of the analysis and the level of β should be addressed. Estimation of the requisite sample size to diminish the probability of a Type II error required the use of a much larger sample size than that employed. Significance at the levels found was not an expectation given the sample size.

These differences between the fathers and mothers prenatally are particularly important because they provide the first description of the father in the period before the birth of his child. Seeman and Evans (1962) found that subjects who were less informed about their illnesses had higher Chance and Powerful Others Scales. In this sample, mothers were thought to be more well informed, but had higher Powerful Others results than the fathers. The mothers' scales were still fairly low. The findings of more feelings of internal control on the part of the fathers and more control by Powerful Others on the part of the mothers are consistent with each other. Schneider and Eichmann (1988) found

increased External control in pregnant women compared to their spouses. The authors state that with one exception no differences in locus of control expectancies had been found between the sexes in 100 studies. Further exploration is needed to see if this difference holds true for all parents in pregnancy, the parents in the military system, or whether it was just a characteristic of this small sample group.

It would be instructive to replicate this testing with a military population of couples not expecting children to see if these results are stable for this relationship. It would also be helpful to know definitively if these results are a function of gender, or of the encounter with military health care for pregnancy. One mother was an active duty member. Inclusion of more active duty mothers in the sample would better differentiate control expectancies of pregnancy with respect to gender and role or occupation.

Adjective Checklist

The Adjective Checklist (ACL) (Gough & Heilbrun, 1965) provides a reliable assessment of personality characteristics as gained from an individual's choice of 300 adjectives. From the words checked, a value on each of 24 scales is determined. Each scale has an individual meaning and correlation with other tests. The test-retest correlation coefficient of the entire instrument was found to be 0.54. The authors argued that this low reliability might actually represent accuracy in testing rather than unreliability in measuring stable individuals. "Might not stability vs. instability of the self-image on the ACL reflect a personological disposition, not just statistical error" (Gough & Heilbrun, 1965,

p. 12)? In other words, the authors propose that reliability on the scales may define a "reliable" individual. Reliability of the scales themselves varied from low for need for succorance (male, r = 0.54; female, r = 0.45) and lability (male, r = 0.56; female, r = 0.59) to quite high for self-confidence (male, r = 0.73; female, r = 0.64) , need for dominance (male, r = 0.76; female, r = 0.79) , and need for exhibition (male, r = 0.68; female, r =0 .85). Validity has been demonstrated by equivalence with various instrumental and experiential studies such as the Minnesota Multiphasic Personality Inventory (MMPI) (Gough & Heilbrun, 1965).

The favorable and unfavorable scales refer to the numbers of adjectives which the subject has checked that reflect self-enhancing and self-detracting views of themselves, respectively. The authors described those who check a high number of favorable adjectives as concerned with social desirability. Those who check a low number were more individual. High numbers of unfavorable adjectives were indicative of a lack of control over hostile feelings, while those with a low number were described as "placid...more tactful, and probably less intelligent" (Gough & Heilbrun, 1965. p. 6). Defensiveness, Self-confidence, Self-control, Lability, and Personal Adjustment are direct scales which mirror self evaluation. The rest of the scales were based on an earlier need-trait system, and depict need states. Thus, these adjectives picture motive states that the subject finds necessary to function within society rather than static values.

Purpose

The purpose of this research question was exploratory. The responses on the Adjective Check List scales of the men and the women were compared to distinguish differences related to gender.

Hypotheses

Ho-3: There is no difference in self-assessed personality scores on the ACL between expectant mothers and fathers in the last trimester of pregnancy.

Ha-3: There is a difference in self-assessed personality scores on the ACL between expectant mothers and fathers in the last trimester of pregnancy.

Method

Subjects. The subjects tested were the 15 couples who originally entered into the study.

Design. This sought to determine the relationship between gender and the scales of the Adjective Check List by means of the Wilcoxon signed-ranks test.

Procedure. At the same time as the STAI and Locus of Control studies were done, 2-4 weeks before delivery, the ACL was given. Participants were told the pencil and paper tests would require about 20 minutes. The order of administration was not controlled. Responses on the ACL were scored using an ACL scoring program (Ward, 1989) and the results were analyzed with the Wilcoxon signed-ranks test for matched pairs using Minitab Release 9.1 (1992). Descriptive statistics for all raw values were obtained using Excel 4.0 (1992). All alpha levels were 0.05.

Results

No significant differences were found between men and women on any of the ACL scales (see Table 4). In relation to the average standard score for normal groups of 50, the means for all groups fell within one standard deviation from the mean. All groups were more Favorable than Unfavorable in their self-assessments. Although not significant, some scales suggested differences between the genders. Men in the present study were more Defensive, and had higher scores on the scales assessing Self-control, Lability, Personal Adjustment, and the Needs for Achievement, Order, Nurturance or helpfulness, Change, Abasement or feeling of inferiority, and Deference or modesty. Men also scored higher on Needs for Affiliation, the need to make and preserve relationships; Endurance, which was described as being conventional, persistent, responsible, and concerned about justice; and Intraception, the effort to understand one's own or someone else's behavior.

Table 4

Gender Differences on the Adjective Check List (ACL) - Means of Standard Scores

Variable	men	women		
Defensiveness	M = 54.13	M = 51.40	T = 0.95	df=27
	SD = 8.89	SD = 8.05	p = 0.35	
Favorable	M = 53.93	M = 55.60	T = -0.53	df=25
	SD = 7.46	SD = 13.05	p = 0.60	
Unfavorable	M = 43.80	M = 46.20	T = -0.25	df=25
	SD = 2.65	SD = 7.81	p = 0.81	
Self-confidence	M = 52.73	M = 53.93	T = -0.33	df=25
	SD = 6.02	SD = 9.47	p = 0.75	
Self-control	M = 53.60	M = 51.27	T = 0.98	df=27
	SD = 8.34	SD = 7.70	p = 0.34	
Lability	M = 49.80	M = 48.33	T = 0.43	df=27
	SD = 9.52	SD = 8.845	p = 0.67	
Personal	M = 53.20	M = 51.60	T = 0.25	df=26
Adjustment	SD = 6.53	SD = 9.06	p = 0.81	

(table continues)

Table 4 (continued)

Variable	men	women		
Need for Achievement	M = 56.47 SD = 6.78	M = 53.27 SD = 11.73	T = 0.98 p = 0.34	df=27
Need for Dominance	M = 55.73 SD = 5.53	M = 56.33 SD = 9.59	T = -0.04 p = 0.97	df=25
Need for Endurance	M = 56.73 SD = 5.09	M = 53.40 SD = 8.32	T = 1.99 p = 0.06	df=27
Need for Order	M = 54.13 SD = 6.07	M = 51.47 SD = 7.94	T = 1.13 p = 0.27	df=27
Need for Intraception	M = 56.40 SD = 8.76	M = 51.27 SD = 7.68	T = 1.47 p = 0.15	df=27
Need for Nurturance	M = 54.20 SD = 8.39	M = 51.07 SD = 8.93	T = 1.00 p = 0.33	df=27
Need for Affiliation	M = 53.67 SD = 9.06	M = 49.53 SD = 8.96	T = 1.51 p = 0.14	df=27

(table continues)

Table 4 (continued)

Variable	men	women		
Need for Heterosexuality	M = 49.27 SD = 7.57	M = 51.60 SD = 10.40	T = -0.64 p = 0.53	df=26
Need for Exhibition	M = 48.60 SD = 7.69	M = 51.07 SD = 5.31	T = -1.17 p = 0.25	df=26
Need for Autonomy	M = 49.27 SD = 8.16	M = 51.87 SD = 6.62	T = -0.93 p = 0.36	df=27
Need for Aggression	M = 47.07 SD = 9.85	M = 51.80 SD = 8.60	T = -1.46 p = 0.16	df=27
Need for Change	M = 47.47 SD = 7.18	M = 46.67 SD = 7.75	T = 0.47 p = 0.64	df=27
Need for Succorance	M = 41.47 SD = 3.94	M = 45.13 SD = 6.72	T = -2.02 p = 0.05	df=26
Need for Abasement	M = 44.13 SD = 6.14	M = 43.93 SD = 9.34	T = 0.02 p = 0.98	df=25

(table continues)

Table 4 (continued)

Variable	men	women		
Need for	M = 49.07	M = 48.27	T = 0.37	df=27
Deference	SD = 9.12	SD = 6.96	p = 0.72	

[a]n = 15 couples for all groups

Women were found to have a tendency towards more Need for Aggression than men. Behaviors tapping into this scale are competition, rivalry, and disruption (Gough & Heilbrun, 1965). Moreover, women selected a greater number of Unfavorable adjectives. This finding is associated with "impulsive lack of control over the hostile and unattractive aspects of one's personality" (Gough & Heilbrun, 1965, p.6). Women had a higher Need for Succorance, seeking support from another; Favorable adjectives; Self-confidence; and Needs for Dominance; Autonomy, Heterosexuality or the need to seek interaction with opposite sex peers; and Exhibition.

Discussion

Analytical power is restricted by the sample size. Larger sample size, and testing with active duty expectant mothers would clarify if these are consistent feelings in the pregnant population or a function of the more traditional posture of the "military wife". None of the scales in which the women scored higher were significantly different than the men. All responses were clustered around the standardized mean. One greater tendency found for the fathers, a Need for Affiliation is understandable in an organization founded on teamwork and conformity. The higher Need for Intraception and the Need for Endurance are also prototypical of military personnel. Self-control, Lability, Personal Adjustment, the Need for Achievement, and the Need for Deference are all valued characteristics in the military establishment. Higher maternal scores on Self-confidence, and the Needs for Dominance, Heterosexuality, Exhibition, Autonomy, and Aggression described an action oriented, assertive individual.

This was an excellent but general portrayal of these mothers who agreed to the scrutiny of a research study.

Fekken (1984) criticized the Adjective Check List for a lack of a general theory on which the scales were based. The empirical basis for the scales has resulted in their considerable overlap which has been noted here. The consistency of the maternal results, in particular, was due to the fact that the scales were drawn from many of the same adjectives. Livneh (1989) found that the overlapping scale structure diminished the ability to perform factor analysis and was poorly predictive of attitude and future behavior in assessing learning behaviors in health service professionals.

Neither men nor women had extreme standard scores on this test. Increasing the sample size would allow a more meaningful comparison with previously tested populations, such as college students, and a better description of the expectant couple. This instrument was useful in providing a general assessment of the expectant couple and found no personality differences between the genders.

Impact of Imagery on Psychological Status

The fourth research question was, "What is the relationship between coping strategies and the psychological status of the parents both before and after delivery?" This portion of the study sought to determine whether the use of active imagery in pregnancy reduced anxiety levels, increased feelings of control, and improved feelings of self-worth, as the literature has indicated in other conditions (Bachman, 1990; Bridge et al., 1988; and Holden-Lund, 1988). To assess this, the STAI, Locus of Control Scales, and ACL were administered after delivery and the results compared with pre-delivery answers.

State Trait Anxiety Inventory

Spielberger and Jacobs (1979) evaluated four studies of the correlation between maternal emotions and complications of pregnancy. By using the STAI, researchers found associations between anxiety and obstetric complications in all three trimesters (Gorsuch & Key; Lubin, Gardener, & Roth; Srabstein, Bejar, Ellison, Weingold, Marinoff, & Stefancik; and Edwards & Jones, all cited in Spielberger & Jacobs, 1979). Imprecise definitions of complications and biased attitudes towards women flawed these studies. However, these researchers found that the STAI was a valid and reliable measure in this obstetric population. In addition, King (1988) found the STAI to be a reliable tool in imagery assessment.

Purpose

The purpose of this research question was to determine if the responses to both State and Trait scales on the STAI differed between the control and the experimental imagery groups before and after labor and delivery.

Hypotheses

Ho-4a: There is no difference in anxiety as measured by the STAI between subjects who used active imagery as a coping strategy during labor and delivery and those who did not.

Ha-4a: There is a difference in anxiety as measured by the STAI between subjects who used active imagery as a coping strategy during labor and delivery and those who did not.

Ho-4b: There is no difference in anxiety as measured by the STAI in subjects before compared to after delivery.

Ha-4b: There is a difference in anxiety as measured by the STAI in subjects before compared to after delivery.

Ho-4c: There is no difference in anxiety as measured by the STAI between men and women subjects before or after delivery.

Ha-4c: There is a difference in anxiety as measured by the STAI between men and women subjects before or after delivery.

Ho-4d: There is no interaction of gender and treatment in STAI scores.

Ha-4d: There is an interaction of gender and treatment in STAI scores.

Method

Subjects. The subjects tested were eight couples (three experimental and five control group) who completed and returned the post-delivery questionnaires.

Design. This is a pre- post experimental design which tests the effect of active imagery on responses to the STAI.

Procedure. After the delivery, each participant was asked to complete the State Trait Anxiety Inventory (STAI) reflecting how they felt at the time of testing. Responses before delivery were compared to the postnatal responses for both groups on the STAI and analyzed by means of the General Linear Model (GLM) analysis of variance for repeated measures, using couples as a blocking factor and SAS/STAT (SAS Institute, 1990). This model offers a conservative interpretation of the data.

Results

On the STAI, for the mothers and fathers, no between subject or within subject differences were found for either the State component (see Table 5) or the Trait component (see Table 6). There was no difference in scores after delivery and no difference between genders or groups. Neither the use of imagery nor the experience of the birth itself caused a significant difference in anxiety scores.

Table 5

Effects of the Use of Active Imagery on State Trait Anxiety Inventory (State)

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	95.01	1	95.01	1.42	0.27
Block	0.67	1	0.67	0.01	0.92
Block*Group	2.13	1	2.13	0.03	0.86
Gender	45.56	1	45.56	0.68	0.43
Group*Gender	196.20	1	196.20	2.92	0.12
Block*Gender	42.67	1	42.67	0.64	0.45
Block*Group*Gender	6.53	1	6.53	0.10	0.76
Error	536.66	8	67.08		
Dependent Variable: Time 2					
Group	319.70	1	319.70	2.48	0.15
Block	45.37	1	45.37	0.35	0.57
Block*Group	46.87	1	46.87	0.36	0.56
Gender	33.06	1	33.06	0.26	0.63
Group*Gender	40.84	1	40.84	0.32	0.59
Block*Gender	15.04	1	15.04	0.12	0.74
Block*Group*Gender	4.41	1	4.41	0.03	0.86
Error	1031.63	8	128.95		

(table continues)

Table 5 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	66.15	1	66.15	0.56	0.47
Block	35.04	1	35.04	0.30	0.60
Block*Group	29.01	1	29.01	0.25	0.63
Gender	156.25	1	156.25	1.33	0.28
Group*Gender	58.02	1	58.02	0.49	0.50
Block*Gender	7.04	1	7.04	0.06	0.81
Block*Group*Gender	0.21	1	1.21	0.00	0.97
Error	938.03	8	117.25		

Table 6

Effects of the Use of Active Imagery on State Trait Anxiety Inventory (Trait)

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	0.71	1	0.71	0.03	0.88
Block	2.33	1	2.33	0.09	0.78
Block*Group	72.92	1	72.92	2.68	0.15
Gender	28.57	1	28.57	1.05	0.34
Group*Gender	165.03	1	165.03	6.07	0.05
Block*Gender	0.76	1	0.76	0.03	0.87
Block*Group*Gender	24.28	1	24.28	0.89	0.38
Error	163.10	8	27.18		
Dependent Variable: Time 2					
Group	244.02	1	244.02	2.58	0.15
Block	1.04	1	1.04	0.01	0.92
Block*Group	216.01	1	216.01	2.28	0.17
Gender	1.00	1	1.00	0.01	0.92
Group*Gender	5.40	1	5.40	0.06	0.82
Block*Gender	18.37	1	18.37	0.19	0.67
Block*Group*Gender	46.87	1	46.87	0.50	0.50
Error	757.03	8	94.63		

(table continues)

Table 6 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	83.31	1	83.31	1.91	0.22
Block	13.76	1	13.76	0.31	0.59
Block*Group	0.04	1	0.04	0.00	0.98
Gender	16.07	1	16.07	0.37	0.57
Group*Gender	117.03	1	117.03	2.68	0.15
Block*Gender	13.76	1	13.76	0.31	0.59
Block*Group*Gender	109.03	1	109.03	2.50	0.16
Error	262.20	8	43.70		

Means increased after delivery, indicating an increase in State anxiety in all groups (see Table 7). As is seen in Table 8, there was a reduction in Trait anxiety for both men and women in the experimental group after delivery and an increase in the control group.

Discussion

The anticipated result of the use of active imagery was that both State and Trait anxiety would be reduced. The fact that the null hypothesis was not rejected, was influenced by the low power of the analysis. Differences in this population could not be detected or defended by this sample size.

The predicted difference was that the State anxiety level would be less in the experimental group after delivery due to the calming influence of the use of imagery. All groups had non-significant increases in State anxiety after delivery. Control group men did have a higher State mean score than did experimental group men after delivery. However, with such a small group and non-significant findings, it is not possible to attribute the difference to this intervention. Many stressors associated with child rearing, for example, sleep deprivation, integration of a new family member, and change in lifestyle could have produced an increase in State anxiety. Administration of the instrument in the hospital or very soon after the return home might control for the intervening variables possibly operating here.

The State scale has been found to discriminate situational stress in populations of military recruits and college students (Chaplin, 1984). It has been used widely and found to be valid. Its internal consistency ranges from a

Table 7

Mean State Scores Before and After Delivery

Group	Gender	n		Pre-delivery	Post-delivery
All		16	M	29.31	33.56
			SD	7.85	10.17
Control		10	M	31.20	36.40
			SD	8.46	10.97
Experimental		6	M	26.17	32.17
			SD	6.11	12.61
Men		8	M	27.62	34.37
			SD	6.76	11.95
Women		8	M	31.00	32.75
			SD	8.94	8.79
	men	5	M	26.80	36.60
			SD	7.19	15.14
Control					
	women	5	M	35.60	36.20
			SD	7.80	6.42
	men	3	M	29.00	30.67
			SD	7.21	2.89
Experimental					
	women	3	M	23.33	27.00
			SD	4.16	10.44

Table 8

Mean Trait Scores Before and After Delivery

Group	Gender	n		Pre-delivery	Post-delivery
All		14	M	32.28	33.75
			SD	5.63	9.45
Control		10	M	32.00	36.90
			SD	5.81	8.29
Experimental		4	M	32.50	28.83
			SD	7.14	9.24
Men		7	M	30.71	33.62
			SD	6.07	9.66
Women		7	M	33.57	34.12
			SD	5.88	9.52
	men	5	M	28.40	36.20
			SD	5.55	10.78
Control					
	women	5	M	35.60	37.60
			SD	3.58	6.10
	men	2	M	36.50	29.33
			SD	2.12	7.09
Experimental					
	women	2	M	28.50	28.33
			SD	9.19	12.74

coefficient alpha of 0.86 to 0.95 (Chaplin, 1984). In this situation, the STAI itself was easy to administer and score and provided a dependable assessment of State anxiety.

The reduction of Trait anxiety in the experimental groups after delivery and use of imagery, and the increase in the control group are intriguing. The lack of power of the analysis renders this result of no import. However, a larger sample could help explore the possibility that basic changes in Trait are due to the practice of imagery. All of the participants' STAI scores were in the low range. The differences noted are minor with no behavioral ramifications.

However, the stability of the Trait scale of the STAI has been questioned (Chaplin, 1984; Van der Ent, Smorenburg, & Bonke, 1987). What is being measured by the Trait scale is uncertain. Chaplin (1984) states the scale may be more related to self dissatisfaction than anxiety. Van der Ent et al. (1987) found the scale unstable, although they were not able to distinguish if this was due to the passage of time, or stress, or both. In this application, it was vital to measure Trait scores after the passage of time in stressful situations. In light of this instability, and given the small sample, assessment of the Trait scale of the STAI was not helpful in determining differences in Trait anxiety before and after delivery. An alternative method of assessing anxiety reaction to stress is needed. Qualitative assessment might be used as could another anxiety scale.

Locus of Control Scales

Purpose

The purpose of this research question was to determine if the use of imagery as a coping strategy by the experimental group was associated with differences in feelings of control found on Levenson's locus of control scales and the Pregnancy Attitude Index (PAI) when compared to the control group.

Hypotheses

Ho-5a: There is no difference in Locus of Control scales between subjects who used active imagery as a coping strategy during labor and delivery and those who did not.

Ha-5a: There is a difference in Locus of Control scales between subjects who used active imagery as a coping strategy during labor and delivery and those who did not.

Ho-5b: There is no difference in Locus of Control scales in subjects before compared to after delivery.

Ha-5b: There is a difference in Locus of Control scales in subjects before compared to after delivery.

Ho-5c: There is no difference in Locus of Control scales between men and women subjects.

Ha-5c: There is a difference in Locus of Control scales between men and women subjects.

Ho-5d: There is no interaction of gender and treatment in Locus of Control scales.

Ha-5d: There is interaction of gender and treatment in Locus of Control scales.

Method

Subjects. The subjects tested were eight couples (three experimental and five control group) who completed and returned the post delivery questionnaires.

Design. This is a pre- post experimental design which tests the effect of active imagery on responses to locus of control instruments

Procedure. After the delivery each participant was asked to complete the locus of control scales reflecting how they felt at the time of testing. Prenatal responses on Levenson's (1972) Locus of Control scales and the PAI were compared to post-delivery responses and analyzed with the General Linear Model analysis of variance for repeated measures, using couples as a blocking factor, and SAS/STAT (SAS Institute, 1990). This model offers a conservative interpretation of the data.

Results

As shown in Table 9, significant differences were found between gender before delivery on the Internal Scale. After delivery there was a significant block

Table 9

Effects of the Use of Active Imagery on Locus of Control Scales (Internal)

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	0.02	1	0.02	0.00	0.97
Block	0.37	1	0.37	0.03	0.86
Block*Group	6.07	1	6.07	0.50	0.50
Gender	132.25	1	132.25	10.93	0.01
Group*Gender	3.75	1	3.75	0.31	0.59
Block*Gender	0.04	1	0.04	0.00	0.95
Block*Group*Gender	18.41	1	18.41	1.52	0.25
Error	96.83	8	12.10		
Dependent Variable: Time 2					
Group	29.40	1	29.40	0.95	0.36
Block	84.37	1	84.37	2.71	0.14
Block*Group	16.87	1	16.87	0.54	0.48
Gender	64.00	1	64.00	2.06	0.19
Group*Gender	38.40	1	38.40	1.24	0.30
Block*Gender	15.04	1	15.04	0.48	0.51
Block*Group*Gender	60.21	1	60.21	1.94	0.20
Error	248.70	8	31.09		

(table continues)

Table 9 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	28.02	1	28.02	1.72	0.22
Block	96.00	1	96.00	5.91	0.04
Block*Group	2.70	1	2.70	0.17	0.69
Gender	12.25	1	12.25	0.75	0.41
Group*Gender	66.15	1	66.15	4.07	0.08
Block*Gender	16.67	1	16.67	1.03	0.34
Block*Group*Gender	12.03	1	12.03	0.74	0.41
Error	129.93	8	16.24		

effect indicating the LOC within a couple had changed. The means for the Internal scale, as shown in Table 10, exhibit little difference after delivery in scores of both men and women of the Control group compared to before delivery. There was a very minimal decrease for men in the Experimental group, and an increase in women in the Experimental group after their use of imagery. The hypothesized increase in feelings of Internal control in the mothers and fathers of the Experimental group was not found.

Responses on the Powerful Others scale (Tables 11 & 12) indicated significant differences between groups before and after delivery (Figure 1). Pre- and post-delivery means for all are low. Women had higher scores than men both before and after the delivery (Figure 2). It was anticipated that the mothers and fathers who had used imagery would have less feeling of control by Powerful Others. There was no significant change over time seen.

Tables 13 and 14 show that scores on the Chance scale were significantly different between groups after delivery. This change compared to pre-delivery responses is shown in Figure 3. The Control group reported an increase in feelings of control by Chance while the Experimental group scores decreased (see Table 14).

Table 10

Mean Locus of Control Scores (Internal) Before and After Delivery

Group	Gender	n		Pre-delivery	Post-delivery
All		16	M	37.12	37.25
			SD	4.14	6.09
Control		10	M	37.10	36.20
			SD	4.01	6.44
Experimental		6	M	37.16	39.00
			SD	4.75	5.55
Men		8	M	40.00	39.25
			SD	2.88	5.26
Women		8	M	34.25	35.25
			SD	3.10	6.54
	men	5	M	39.60	39.40
			SD	2.30	4.88
Control					
	women	5	M	35.75	35.75
			SD	3.40	2.87
	men	3	M	40.67	39.00
			SD	4.16	7.00
Experimental					
	women	3	M	33.67	39.00
			SD	1.53	5.29

Table 11

Effects of the Use of Active Imagery on Locus of Control Scales (Powerful Others)

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	283.84	1	283.84	12.48	0.01
Block	63.37	1	63.37	2.79	0.13
Block*Group	27.07	1	27.07	1.19	0.31
Gender	689.06	1	689.06	30.31	<0.001
Group*Gender	158.44	1	158.44	6.97	0.03
Block*Gender	0.04	1	0.04	0.00	0.97
Block*Group*Gender	5.21	1	5.21	0.23	0.64
Error	181.90	8	22.74		
Dependent Variable: Time 2					
Group	670.00	1	670.00	14.89	<0.01
Block	6.00	1	6.00	0.13	0.72
Block*Group	58.80	1	58.80	1.31	0.29
Gender	742.56	1	742.56	16.51	<0.01
Group*Gender	4.00	1	4.00	0.09	0.77
Block*Gender	32.67	1	32.67	0.73	0.42
Block*Group*Gender	22.53	1	22.53	0.50	0.50
Error	359.87	8	44.98		

(table continues)

Table 11 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	81.67	1	81.67	3.28	0.11
Block	108.37	1	108.37	4.35	0.07
Block*Group	6.07	1	6.07	0.24	0.63
Gender	1.00	1	1.00	0.04	0.85
Group*Gender	112.07	1	112.07	4.50	0.07
Block*Gender	35.04	1	35.04	1.41	0.27
Block*Group*Gender	49.41	1	49.41	1.98	0.20
Error	199.37	8	24.92		

Table 12

Mean Locus of Control Scores (Powerful Others) Before and After Delivery

Group	Gender	n		Pre-delivery	Post-delivery
All		16	M	17.94	21.19
			SD	9.69	11.24
Control		10	M	21.20	26.20
			SD	10.61	9.93
Experimental		6	M	12.50	12.83
			SD	4.72	8.23
	men	8	M	11.38	14.38
			SD	4.31	9.16
	women	8	M	24.50	28.00
			SD	9.18	8.99
	men	5	M	12.20	19.00
			SD	4.20	8.34
Control					
	women	5	M	30.20	33.40
			SD	5.76	4.77
	men	3	M	10.00	6.67
			SD	5.00	3.51
Experimental					
	women	3	M	15.00	19.00
			SD	3.46	6.56

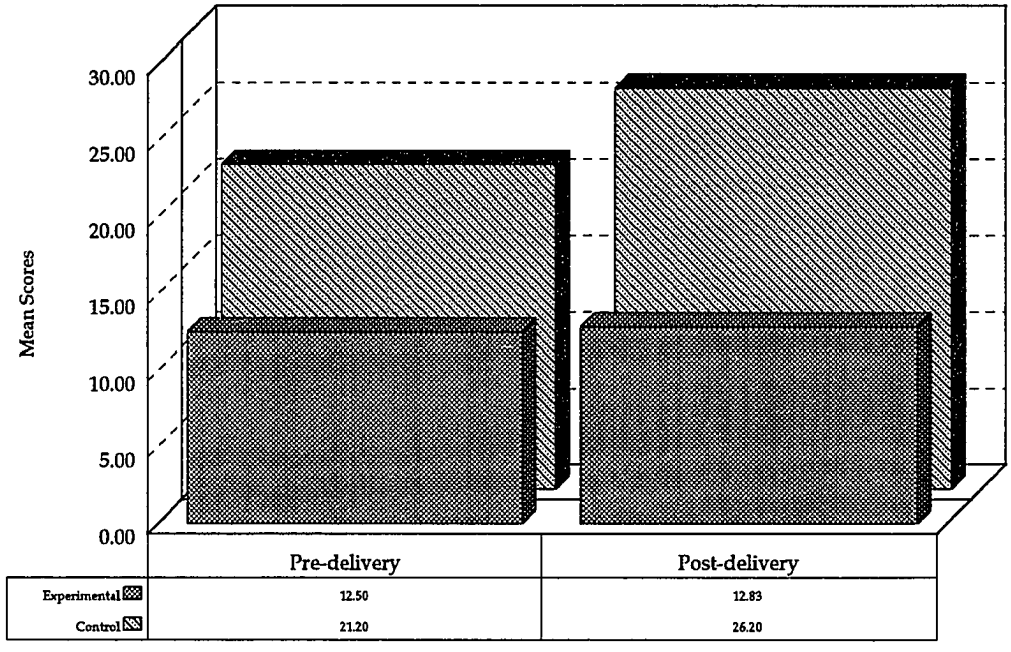

Figure 1. Mean Locus of Control Scores (Powerful Others) before and after delivery by group.

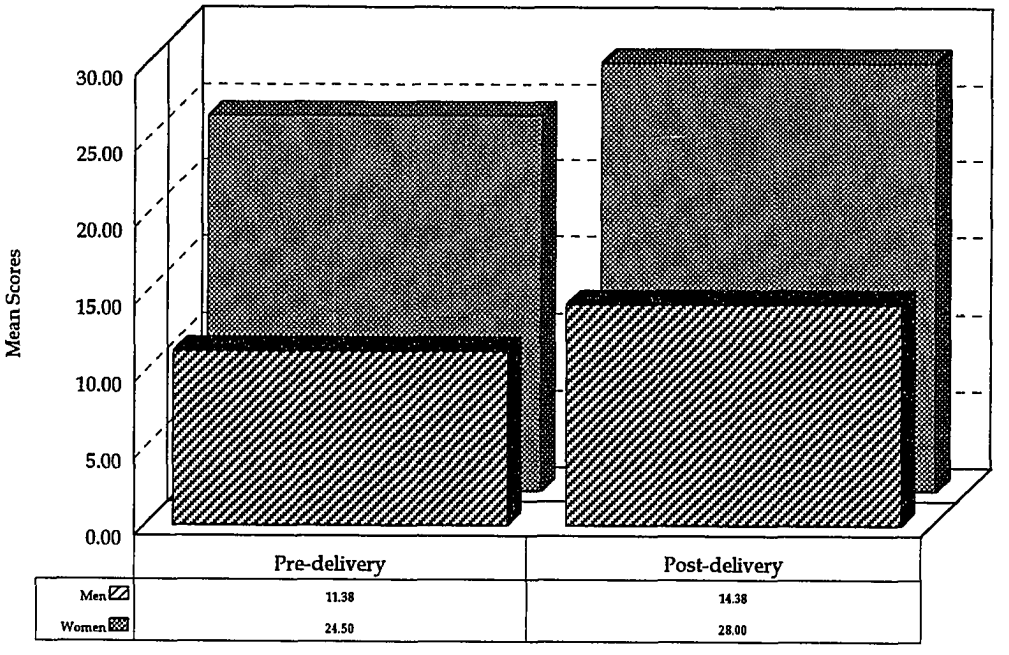

Figure 2. Mean Locus of Control Scores (Powerful Others) before and after delivery by gender.

Table 13

Effects of the Use of Active Imagery on Locus of Control Scales (Chance)

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	152.04	1	152.04	2.81	0.13
Block	1.50	1	1.50	0.03	0.87
Block*Group	218.70	1	218.70	4.04	0.08
Gender	138.06	1	138.06	2.55	0.15
Group*Gender	49.50	1	49.50	0.92	0.37
Block*Gender	0.17	1	0.17	0.00	0.96
Block*Group*Gender	100.83	1	100.83	1.86	0.21
Error	432.67	8	54.08		
Dependent Variable: Time 2					
Group	984.15	1	984.15	51.51	<0.001
Block	7.04	1	7.04	0.37	0.56
Block*Group	52.01	1	52.01	2.72	0.14
Gender	506.25	1	506.25	26.50	<0.001
Group*Gender	84.02	1	84.02	4.40	0.07
Block*Gender	7.04	1	7.04	0.37	0.56
Block*Group*Gender	106.41	1	106.41	5.57	0.05
Error	152.83	8	19.10		

(table continues)

Table 13 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	362.60	1	362.60	10.83	0.01
Block	15.04	1	15.04	0.45	0.52
Block*Group	57.41	1	57.41	1.71	0.23
Gender	115.56	1	115.56	3.45	0.10
Group*Gender	4.54	1	4.54	0.14	0.72
Block*Gender	9.37	1	9.37	0.28	0.61
Block*Group*Gender	0.07	1	0.07	0.00	0.96
Error	267.83	8	33.48		

Table 14

Mean Locus of Control Scores (Chance) Before and After Delivery

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	11.31	15.13
			SD	8.54	11.25
Control		10	M	13.70	21.20
			SD	7.33	8.90
Experimental		6	M	7.33	5.00
			SD	9.56	6.36
men		8	M	8.38	9.50
			SD	6.37	6.59
women		8	M	14.25	20.75
			SD	9.79	12.48
	men	5	M	9.40	13.80
			SD	6.19	3.03
Control					
	women	5	M	18.00	28.60
			SD	6.04	5.68
	men	3	M	6.67	2.33
			SD	7.64	3.21
Experimental					
	women	3	M	8.00	7.67
			SD	13.00	8.32

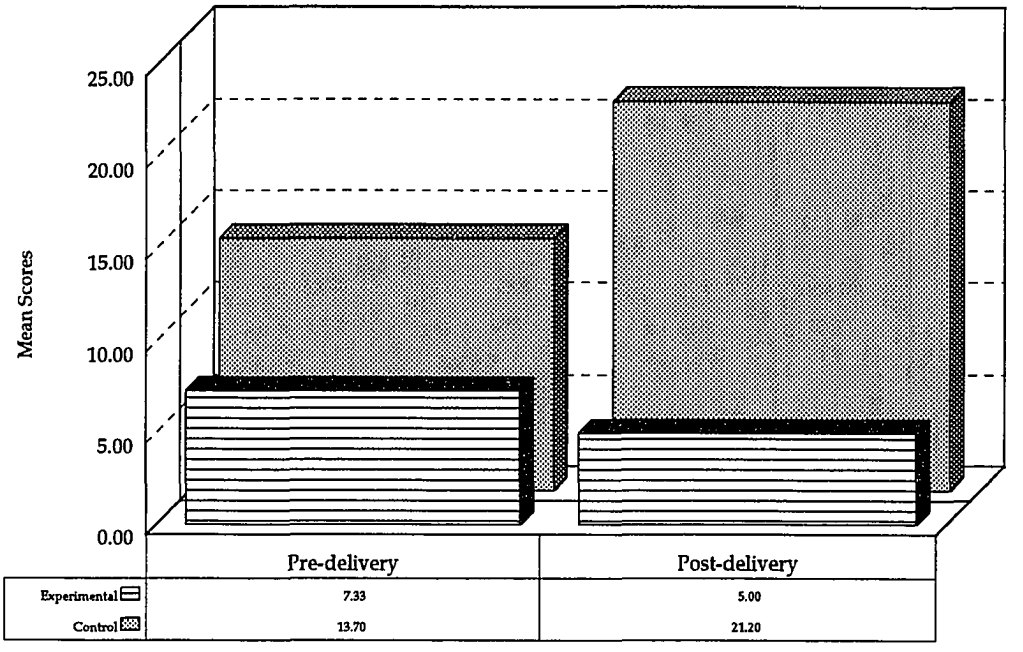

Figure 3. Mean Locus of Control Scores (Chance) before and after delivery by group.

Experimental group scores, before delivery, were low and decreased after the delivery. Empowerment by the use of imagery was predicted to lessen feelings of control by Chance.

Discussion

An increase in feelings of Internal control was predicted for those couples who had used active imagery in labor. Imagery mothers did have an increase in Internal scores, although the scores were not statistically significant. Mean scores for all couples were between 33.67 and 40.67 which placed them in the higher range of scores. This was expected in a self-selected group who had volunteered for a research study. Individuals with a strong feeling of personal control retained that feeling throughout the birth experience. Although the predicted increase for Imagery users did not take place, these were Internally motivated individuals.

External control by Powerful Others is experienced in dependent situations. Health care seeking, even for the medical professional, places that person in the posture of taking direction from experts. Women felt more controlled than men did. This was probably due to their role as "patient". This study hoped to decrease that feeling by giving the mother, in particular, a mechanism to control her situation. Experimental women had much lower post-delivery scores than Control mothers after delivery, although their scores rose after delivery. As shown in Table 12, the Control group had higher Powerful Others scale scores than the Experimental group both before and after delivery. The major contributors to these means was the Control group women, however, with far

higher scores than the Experimental women. Powerful Others mean scores for Control group men increased while Experimental group men's scores decreased after delivery. Control by Chance was significantly different after delivery, with the Control group members feeling more control by chance and the Experimental group feeling less. Qualitative investigation of how the parents in each group viewed the labor and concurrent events is needed to explain the feelings of control.

These findings differ from most locus of control studies which have found no difference between genders. Schneider and Eichmann (1988) also found pregnant women to be more externally controlled than their spouses, as did this study. They stated that no one had examined locus of control in expectant women and their spouses at that time. Groups such as prisoners, college students, and grade school students had been found to exhibit no gender differences in locus of control. Similar to Schneider and Eichmann (1988), this study also found significant differences before delivery, with men more Internally controlled and women more externally controlled (Powerful Others). After delivery, women continued to report feeling manipulation by Powerful Others. Qualitative research to explore the etiology and persistence of such feelings is indicated. Further research is needed to distinguish if this feeling of exterior control was a function of the birth experience itself, the military medical system, or some other variable in the social environment.

Chance, another measure of external control, was significantly different after delivery when women were compared to men. This supports the findings of Schneider and Eichmann (1988) that women in pregnancy felt more external control than their husbands. The paucity of studies of control expectancies in

pregnancy for both parents warrants continued research in this area. All participants reported feeling more externally controlled after the birth, but scores were in the lower range indicating low feelings of external influence. It is interesting that both men and women in the Control group had increased Chance scores after delivery, while both men and women in the Experimental group had decreased feelings of control by Chance. This was consistent with the predicted outcome that imagery groups would feel more Internal control and thus less external control by Chance and Powerful Others. The fact that all subjects had low Chance scores except post-delivery Control group women again demonstrates that these were internally motivated individuals with low feelings of control by Chance and Powerful Others. A larger group is needed to validate this finding for the total population. Locus of control remains one of the most valuable means of assessing individuals in the health care system, particularly in this era of increasing self-care management. Knowing a person's control expectancies and devising strategies to assist in growth, empowers the individual. In summary, the Experimental group women can be described as Internally motivated with minimal feelings of control by Powerful Others and Chance. Experimental group fathers were also Internally motivated, and not influenced by Powerful Others or Chance after delivery. These results are supportive of the hypothesized empowerment by the use of Imagery.

Adjective Checklist

Purpose

The purpose of this research question was to determine if the use of imagery as a coping strategy was associated with effects on self assessment as shown by responses on the ACL.

Hypotheses

Ho-6a: There is no difference in self-assessed personality scores on the ACL between subjects who used active imagery as a coping strategy during labor and delivery and those who did not.

Ha-6a: There is a difference in self-assessed personality scores on the ACL between subjects who used active imagery as a coping strategy during labor and delivery and those who did not.

Ho-6b: There is no difference in self-assessed personality scores on the ACL in subjects before compared to after delivery.

Ha-6b: There is a difference in self-assessed personality scores on the ACL in subjects before compared to after delivery.

Ho-6c: There is no difference in self-assessed personality scores on the ACL between men and women subjects.

Ha-6c: There is a difference in self-assessed personality scores on the ACL between men and women subjects.

Ho-6d: There is no interaction of gender and treatment in self-assessed personality scores on the ACL.

Ha-6d: There is an interaction of gender and treatment in self-assessed personality scores on the ACL.

Method

Subjects. The subjects tested were eight couples (three experimental and five control group) who completed and returned the post-delivery questionnaires.

Design. This is a pre- post experimental design which tests the effect of active imagery on responses to the ACL.

Procedure. After the delivery each participant was asked to complete the ACL instrument reflecting how they felt at the time of testing. Responses before delivery were compared to the responses after delivery for both groups on the ACL and were scored using the ACL scoring program (Ward, 1989). These were analyzed by means of the General Linear Model (GLM) analysis of variance for repeated measures, using couples as a blocking factor, and SAS/STAT (SAS Institute, 1990). This model offers a conservative interpretation of the data.

Results

The results of the ACL scale responses together with each of their descriptive statistics are presented in Tables 15-58. Defensiveness (Table 15) a measure of somewhat gender-specific prototypical attributes has been dropped in later versions of this test. All means for groups and genders on this scale fell within one standard deviation of the standard mean and would be considered normal (see Table 16). In this sample, the only significant change found after the intervention was in the couples, generally defensiveness dropped.

The number of Favorable adjectives chosen (Table 17 & 18) showed a significant change by couple and by group. Control group responses dropped and Experimental group responses increased (Figure 4). However, all couples were less positive after delivery.

Unfavorable adjectives showed no difference between or among groups and were within normal limits (Tables 19 & 20), with the exception of a high score for Experimental men before delivery which dropped to the level of the other groups after delivery.

Self-confidence scale responses (Table 21 & 22) were lower in the Control group after delivery. This change in group after delivery was significant (see Figure 5).

Self-control scale responses (Tables 23 & 24) drawing on adjectives concerning socialization were lower for women and men after the birth while within one standard deviation. This was not a statistically significant change.

Table 15

Effects of the Use of Active Imagery on the ACL Scale Defensiveness

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	210.94	1	210.94	3.99	0.08
Block	24.00	1	24.00	0.45	0.52
Block*Group	58.80	1	58.80	1.11	0.32
Gender	85.56	1	85.56	1.62	0.24
Group*Gender	21.00	1	21.00	0.40	0.55
Block*Gender	112.67	1	112.67	2.13	0.18
Block*Group*Gender	22.53	1	22.53	0.43	0.53
Error	422.93	8	52.87		
Dependent Variable: Time 2					
Group	984.15	1	984.15	29.00	<0.001
Block	192.67	1	192.67	5.68	0.04
Block*Group	112.13	1	112.13	3.30	0.11
Gender	420.25	1	420.25	12.38	0.01
Group*Gender	0.82	1	0.82	0.02	0.88
Block*Gender	28.17	1	28.17	0.83	0.39
Block*Group*Gender	12.03	1	12.03	0.35	0.57
Error	271.53	8	33.94		

(table continues)

Table 15 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	283.84	1	283.84	4.78	0.06
Block	352.66	1	352.67	5.94	0.04
Block*Group	8.53	1	8.53	0.14	0.71
Gender	126.56	1	126.56	2.13	0.18
Group*Gender	13.54	1	13.54	0.23	0.64
Block*Gender	28.17	1	28.17	0.47	0.51
Block*Group*Gender	1.63	1	1.63	0.03	0.87
Error	475.00	8	59.37		

Table 16

Mean Adjective Check List Scores Before and After Delivery (Defensiveness)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	54.81	51.37
			SD	7.99	11.61
Control		10	M	52.00	45.30
			SD	6.45	9.68
Experimental		6	M	59.50	61.50
			SD	8.64	6.22
Men		8	M	57.12	56.50
			SD	7.53	11.49
Women		8	M	52.50	46.25
			SD	8.25	9.84
	men	5	M	55.20	50.60
			SD	4.44	10.24
Control					
	women	5	M	48.80	40.00
			SD	6.94	6.00
	men	3	M	60.33	66.33
			SD	11.59	4.51
Experimental					
	women	3	M	58.67	56.67
			SD	7.09	2.52

Table 17

Effects of the Use of Active Imagery on the ACL Scale Favorable Adjectives

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	91.27	1	91.27	0.87	0.38
Block	15.04	1	15.04	0.14	0.71
Block*Group	285.21	1	285.21	2.71	0.14
Gender	12.25	1	12.25	0.12	0.74
Group*Gender	10.42	1	10.42	0.10	0.76
Block*Gender	360.37	1	360.37	3.42	0.10
Block*Group*Gender	63.07	1	63.07	0.60	0.46
Error	843.37	8	105.42		
Dependent Variable: Time 2					
Group	1738.82	1	1738.82	23.61	0.001
Block	661.50	1	661.50	8.98	0.02
Block*Group	0.30	1	0.30	0.00	0.95
Gender	462.25	1	462.25	6.28	0.04
Group*Gender	98.82	1	98.82	1.34	0.28
Block*Gender	66.67	1	66.67	0.91	0.37
Block*Group*Gender	16.13	1	16.13	0.22	0.65
Error	589.27	8	73.66		

(table ccntinues)

Table 17 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	1033.35	1	1033.35	7.40	0.03
Block	876.04	1	876.04	6.27	0.04
Block*Group	267.01	1	267.01	1.91	0.20
Gender	324.00	1	324.00	2.32	0.17
Group*Gender	45.07	1	45.07	0.32	0.58
Block*Gender	117.04	1	117.04	0.84	0.39
Block*Group*Gender	15.41	1	15.41	0.11	0.75
Error	1117.83	8	139.73		

Table 18

Mean Adjective Check List Scores Before and After Delivery (Favorable)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	55.75	51.37
			SD	10.59	15.56
Control		10	M	53.90	43.30
			SD	10.46	13.23
Experimental		6	M	58.83	64.83
			SD	11.00	7.98
Men		8	M	56.62	56.75
			SD	7.50	14.91
Women		8	M	54.87	46.00
			SD	13.49	15.18
	men	5	M	55.40	50.60
			SD	8.73	14.03
Control					
	women	5	M	52.40	36.00
			SD	12.82	8.00
	men	3	M	58.67	67.00
			SD	5.86	11.53
Experimental					
	women	3	M	59.00	62.67
			SD	16.37	3.51

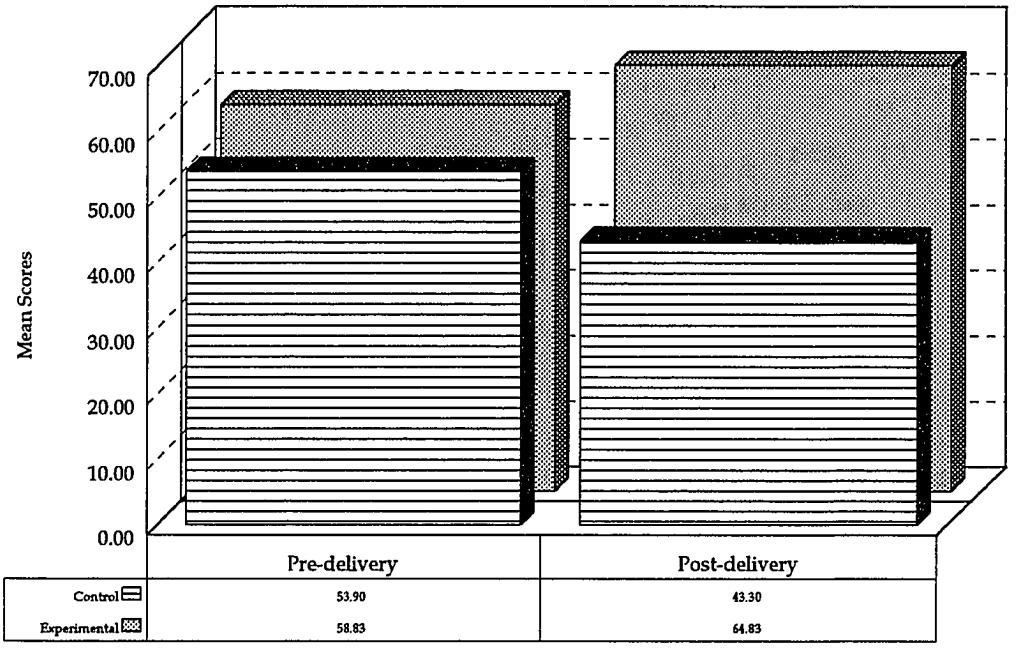

Figure 4. Mean scores of the Favorable adjective scale of the ACL before and after delivery by group.

Table 19

Effects of the Use of Active Imagery on the ACL Scale Unfavorable Adjectives

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	3.50	1	3.50	0.28	0.61
Block	1.50	1	1.50	0.12	0.74
Block*Group	1.20	1	1.20	0.10	0.76
Gender	0.56	1	0.56	0.05	0.84
Group*Gender	4.00	1	4.00	0.33	0.58
Block*Gender	37.50	1	37.50	3.05	0.12
Block*Group*Gender	1.20	1	1.20	0.10	0.76
Error	98.47	8	12.31		
Dependent Variable: Time 2					
Group	50.42	1	50.42	1.57	0.24
Block	13.50	1	13.50	0.42	0.53
Block*Group	0.30	1	0.30	0.01	0.92
Gender	4.00	1	4.00	0.12	0.73
Group*Gender	52.27	1	52.27	1.63	0.24
Block*Gender	1.50	1	1.50	0.05	0.83
Block*Group*Gender	2.70	1	2.70	0.08	0.78
Error	257.07	8	32.13		

(table continues)

Table 19 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	27.34	1	27.34	0.93	0.36
Block	6.00	1	6.00	0.20	0.66
Block*Group	2.70	1	2.70	0.09	0.77
Gender	7.56	1	7.56	0.26	0.63
Group*Gender	27.34	1	27.34	0.93	0.36
Block*Gender	54.00	1	54.00	1.83	0.21
Block*Group*Gender	0.30	1	0.30	0.01	0.92
Error	236.20	8	29.52		

Table 20

Mean Adjective Check List Scores Before and After Delivery (Unfavorable)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	43.43	44.25
			SD	3.14	5.38
Control		10	M	43.80	45.70
			SD	3.22	6.24
Experimental		6	M	42.83	41.83
			SD	3.19	2.40
Men		8	M	43.62	43.50
			SD	2.87	2.50
Women		8	M	43.25	45.00
			SD	3.57	7.39
	men	5	M	43.60	43.40
			SD	3.05	3.21
Control					
	women	5	M	44.00	48.00
			SD	3.74	8.00
	men	3	M	43.67	43.67
			SD	3.21	1.15
Experimental					
	women	3	M	42.00	40.00
			SD	3.61	1.73

Table 21

Effects of the Use of Active Imagery on the ACL Scale Self-Confidence

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	22.20	1	22.20	0.52	0.49
Block	165.37	1	165.37	3.84	0.08
Block*Group	180.07	1	180.07	4.18	0.07
Gender	85.56	1	85.56	1.99	0.20
Group*Gender	6.34	1	6.34	0.15	0.71
Block*Gender	63.37	1	63.37	1.47	0.26
Block*Group*Gender	151.87	1	151.87	3.53	0.10
Error	344.63	8	43.08		
Dependent Variable: Time 2					
Group	348.00	1	348.00	3.31	0.11
Block	9.37	1	9.37	0.09	0.77
Block*Group	54.67	1	54.67	0.52	0.49
Gender	1.56	1	1.56	0.01	0.90
Group*Gender	130.54	1	130.54	1.24	0.30
Block*Gender	2.04	1	2.04	0.02	0.89
Block*Group*Gender	35.21	1	35.21	0.34	0.58
Error	840.03	8	105.00		

(table continues)

Table 21 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	546.02	1	546.02	7.69	0.02
Block	96.00	1	96.00	1.35	0.28
Block*Group	36.30	1	36.30	0.51	0.49
Gender	110.25	1	110.25	1.55	0.25
Group*Gender	79.35	1	79.35	1.12	0.32
Block*Gender	42.67	1	42.67	0.60	0.46
Block*Group*Gender	40.83	1	40.83	0.57	0.47
Error	568.33	8	71.04		

Table 22

Mean Adjective Check List Scores Before and After Delivery (Self Confidence)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	53.69	50.31
			SD	8.24	9.73
Control		10	M	54.60	46.70
			SD	6.98	5.62
Experimental		6	M	52.17	56.33
			SD	10.57	12.56
Men		8	M	51.37	50.62
			SD	4.81	10.39
Women		8	M	56.00	50.00
			SD	10.50	9.74
	men	5	M	51.80	44.80
			SD	5.63	3.90
Control					
	women	5	M	57.40	48.60
			SD	7.63	6.84
	men	3	M	50.67	60.33
			SD	4.04	11.01
Experimental					
	women	3	M	53.67	52.33
			SD	16.01	15.01

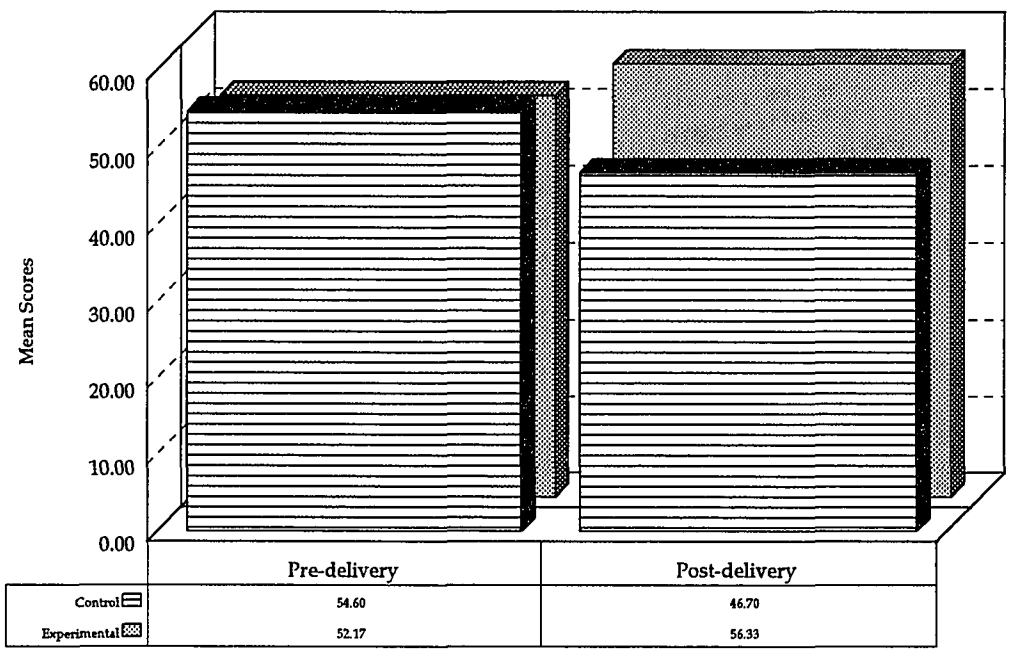

Figure 5. Mean scores of the Self-Confidence scale of the ACL before and after delivery by group.

Table 23

Effects of the Use of Active Imagery on the ACL Scale Self-Control

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	121.84	1	121.84	2.78	0.13
Block	0.04	1	0.04	0.00	0.98
Block*Group	60.21	1	60.21	1.37	0.27
Gender	85.56	1	85.56	1.95	0.20
Group*Gender	6.34	1	6.34	0.14	0.71
Block*Gender	51.04	1	51.04	1.16	0.31
Block*Group*Gender	1.01	1	1.01	0.02	0.88
Error	350.90	8	43.86		
Dependent Variable: Time 2					
Group	4.82	1	4.82	0.03	0.86
Block	3.37	1	3.37	0.02	0.89
Block*Group	567.67	1	567.67	3.66	0.09
Gender	484.00	1	484.00	3.12	0.11
Group*Gender	86.40	1	86.40	0.56	0.48
Block*Gender	117.04	1	117.04	0.75	0.41
Block*Group*Gender	392.41	1	392.41	2.53	0.15
Error	1242.03	8	155.25		

(table continues)

Table 23 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	78.20	1	78.20	0.70	0.43
Block	4.17	1	4.17	0.04	0.85
Block*Group	258.13	1	258.13	2.31	0.17
Gender	162.56	1	162.56	1.45	0.26
Group*Gender	139.54	1	139.54	1.25	0.30
Block*Gender	13.50	1	13.50	0.12	0.74
Block*Group*Gender	433.20	1	433.20	3.87	0.08
Error	895.13	8	111.89		

Table 24

Mean Adjective Check List Scores Before and After Delivery (Self Control)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	55.94	49.12
			SD	6.72	13.90
Control		10	M	53.80	48.70
			SD	5.09	7.12
Experimental		6	M	59.50	49.83
			SD	8.02	22.08
Men		8	M	58.25	54.62
			SD	5.17	6.00
Women		8	M	53.62	43.62
			SD	7.59	17.57
	men	5	M	56.60	52.40
			SD	4.04	6.76
Control					
	women	5	M	51.00	45.00
			SD	4.74	5.83
	men	3	M	61.00	58.33
			SD	6.56	1.15
Experimental					
	women	3	M	58.00	41.33
			SD	10.53	31.63

Lability scale responses (Tables 25 & 26) draw from such attributes as spontaneity, restlessness, and change. No significant differences in Lability were found. This scale has also been dropped in later editions of the test.

Personal Adjustment (Tables 27 & 28), the ability to be positive, dependable, and adjusted was not found to differ significantly across gender groups. The Experimental group had a greater positive attitude after delivery. In addition, Control group women after delivery had lower Personal Adjustment scores than any other group or gender combination. However, these results did not represent a significant change compared to before delivery scores.

The Need for Achievement scores (Tables 29 & 30) changed significantly after delivery. Scores in the Control group dropped while the Experimental group had greater scores after delivery (Figure 6).

A significant change in the Need for Dominance responses (Tables 31 & 32) was found. The Control group means dropped after delivery and the Experimental group means increased (Figure 7). Couples also had a change after the delivery. It was not possible to identify change in individual couples.

The Need for Endurance responses (Tables 33 & 34), the need for persistence in any task, demonstrated no significant change in groups across time.

As seen in Tables 35 and 36, no significant change was found between groups or over time in the Need for Order scale, the need for emphasis on organization.

Table 25

Effects of the Use of Active Imagery on the ACL Scale Lability

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	30.82	1	30.82	0.36	0.56
Block	130.67	1	130.67	1.53	0.25
Block*Group	70.53	1	70.53	0.82	0.39
Gender	42.25	1	42.25	0.49	0.50
Group*Gender	126.15	1	126.15	1.47	0.26
Block*Gender	160.17	1	160.17	1.87	0.21
Block*Group*Gender	20.83	1	20.83	0.24	0.63
Error	684.33	8	85.54		
Dependent Variable: Time 2					
Group	37.60	1	37.60	0.47	0.51
Block	287.04	1	287.04	3.60	0.09
Block*Group	49.41	1	49.41	0.62	0.45
Gender	351.56	1	351.56	4.41	0.07
Group*Gender	429.34	1	429.34	5.39	0.05
Block*Gender	260.04	1	260.04	3.26	0.11
Blcck*Group*Gender	75.21	1	75.21	0.94	0.36
Error	637.23	8	79.65		

(table continues)

Table 25 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	136.50	1	136.50	2.58	0.15
Block	30.37	1	30.37	0.57	0.47
Block*Group	1.87	1	1.87	0.04	0.85
Gender	150.06	1	150.06	2.83	0.13
Group*Gender	90.04	1	90.04	1.70	0.23
Block*Gender	12.04	1	12.04	0.23	0.65
Block*Group*Gender	175.21	1	175.21	3.31	0.11
Error	423.83	8	52.98		

Table 26

Mean Adjective Check List Scores Before and After Delivery (Lability)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	49.94	48.69
			SD	9.33	11.91
Control		10	M	51.20	47.50
			SD	11.33	13.88
Experimental		6	M	47.83	50.67
			SD	4.62	8.43
Men		8	M	51.37	53.37
			SD	10.10	12.61
Women		8	M	48.50	44.00
			SD	8.93	9.72
	men	5	M	55.00	56.20
			SD	11.40	14.20
Control					
	women	5	M	47.40	38.80
			SD	11.08	6.53
	men	3	M	45.33	48.67
			SD	3.05	10.01
Experimental					
	women	3	M	50.33	52.67
			SD	5.03	8.08

Table 27

Effect of the Use of Active Imagery on the ACL Scale Personal Adjustment

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	185.50	1	185.50	3.05	0.12
Block	15.04	1	15.04	0.25	0.63
Block*Group	175.21	1	175.21	2.88	0.13
Gender	33.06	1	33.06	0.54	0.48
Group*Gender	24.70	1	24.70	0.41	0.54
Block*Gender	84.37	1	84.37	1.39	0.27
Block*Group*Gender	1.87	1	1.87	0.03	0.86
Error	486.17	8	60.77		
Dependent Variable: Time 2					
Group	395.27	1	395.27	9.83	0.01
Block	80.67	1	80.67	2.01	0.19
Block*Group	38.53	1	38.53	0.96	0.36
Gender	182.25	1	182.25	4.53	0.06
Group*Gender	312.82	1	312.82	7.78	0.02
Block*Gender	20.17	1	20.17	0.50	0.50
Block*Group*Gender	9.63	1	9.63	0.24	0.64
Error	321.67	8	40.21		

(table continues)

Table 27 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	39.20	1	39.20	0.36	0.57
Block	26.04	1	26.04	0.24	0.64
Block*Group	49.41	1	49.41	0.45	0.52
Gender	60.06	1	60.06	0.55	0.48
Group*Gender	161.70	1	161.70	1.47	0.26
Block*Gender	22.04	1	22.04	0.20	0.67
Block*Group*Gender	3.01	1	3.01	0.03	0.87
Error	880.97	8	110.12		

Table 28

Mean Adjective Check List Scores Before and After Delivery (Personal Adjustment)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	53.44	51.25
			SD	8.19	9.52
Control		10	M	50.80	47.40
			SD	8.40	9.70
Experimental		6	M	57.83	57.66
			SD	6.08	4.88
Men		8	M	54.87	54.62
			SD	7.00	6.72
Women		8	M	52.00	47.87
			SD	9.49	11.10
	men	5	M	53.20	54.20
			SD	7.19	8.67
Control					
	women	5	M	48.40	40.60
			SD	9.63	4.56
	men	3	M	57.67	55.33
			SD	7.02	2.52
Experimental					
	women	3	M	58.00	60.00
			SD	6.56	6.08

Table 29

Effects of the Use of Active Imagery on the ACL Scale Need for Achievement

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	33.00	1	33.00	1.55	0.25
Block	187.04	1	187.04	8.76	0.02
Block*Group	364.01	1	364.01	17.05	<0.001
Gender	68.06	1	68.06	3.19	0.11
Group*Gender	113.44	1	113.44	5.31	0.50
Block*Gender	12.04	1	12.04	0.56	0.47
Block*Group*Gender	161.01	1	161.01	7.54	0.02
Error	170.83	8	21.35		
Dependent Variable: Time 2					
Group	440.10	1	440.10	3.51	0.10
Block	26.04	1	26.04	0.21	0.66
Block*Group	161.01	1	161.01	1.28	0.29
Gender	315.06	1	315.06	2.51	0.15
Group*Gender	121.84	1	121.84	0.97	0.35
Block*Gender	9.37	1	9.37	0.07	0.79
Block*Group*Gender	63.07	1	63.07	0.50	0.50
Error	1003.43	8	125.43		

(table continues)

Table 29 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	714.15	1	714.15	5.97	0.04
Block	352.67	1	352.67	2.95	0.12
Block*Group	40.83	1	40.83	0.34	0.57
Gender	90.25	1	90.25	0.75	0.41
Group*Gender	0.15	1	0.15	0.00	0.97
Block*Gender	0.17	1	0.17	0.00	0.97
Block*Group*Gender	22.53	1	22.53	0.19	0.67
Error	957.00	8	119.62		

Table 30

Mean Adjective Check List Scores Before and After Delivery (Need for Achievement)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	54.69	50.56
			SD	8.60	11.94
Control		10	M	55.80	46.50
			SD	3.55	5.34
Experimental		6	M	52.83	57.33
			SD	13.88	16.99
Men		8	M	56.75	55.00
			SD	4.13	13.46
Women		8	M	52.62	46.12
			SD	11.47	8.92
	men	5	M	55.80	48.80
			SD	3.70	3.56
Control					
	women	5	M	55.80	44.20
			SD	3.83	6.18
	men	3	M	58.33	65.33
			SD	5.13	18.77
Experimental					
	women	3	M	47.33	49.33
			SD	19.09	13.32

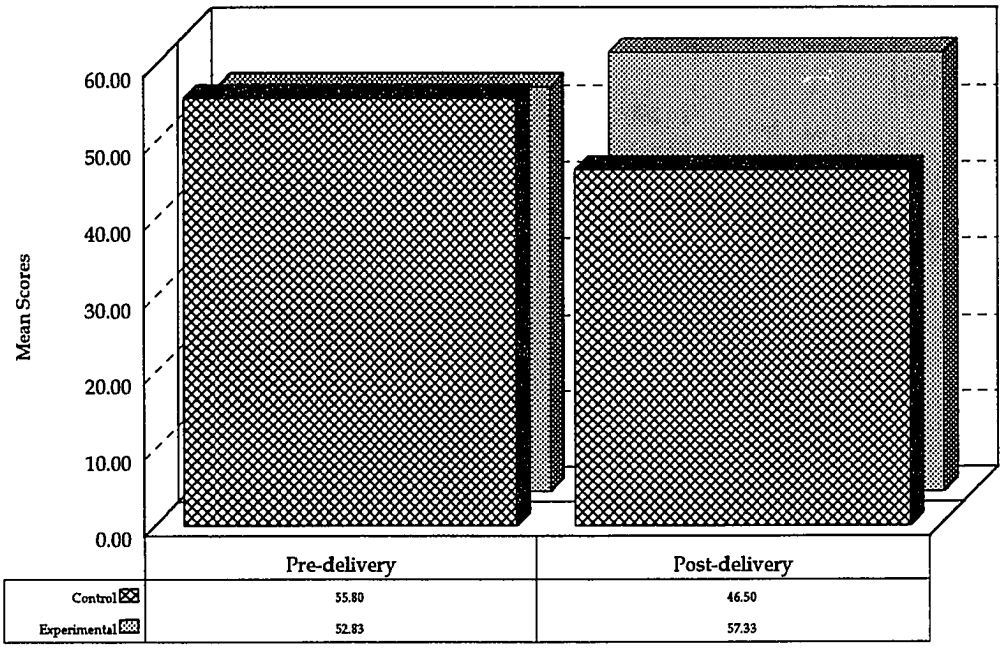

Figure 6. Mean scores of the Need for Achievement scale of the ACL before and after delivery by group.

Table 31

Effects of the Use of Active Imagery on the ACL Scale Need for Dominance

Source	SS	DF	MS	F	P
Dependent Variable: Time1					
Group	0.15	1	0.15	0.00	0.96
Block	210.04	1	210.04	3.84	0.08
Block*Group	122.01	1	122.01	2.23	0.17
Gender	2.25	1	2.25	0.04	0.84
Group*Gender	62.02	1	62.02	1.13	0.32
Block*Gender	15.04	1	15.04	0.27	0.61
Block*Group*Gender	106.41	1	106.41	1.94	0.20
Error	437.83	8	54.73		
Dependent Variable: Time 2					
Group	345.60	1	345.60	3.67	0.09
Block	18.37	1	18.37	0.19	0.67
Block*Group	126.07	1	126.07	1.34	0.28
Gender	9.00	1	9.00	0.10	0.76
Group*Gender	72.60	1	72.60	0.77	0.40
Block*Gender	7.04	1	7.04	0.07	0.79
Block*Group*Gender	7.01	1	7.01	0.07	0.79
Error	754.30	8	94.29		

(table continues)

Table 31 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	360.15	1	360.15	7.06	0.03
Block	352.67	1	352.67	6.92	0.03
Block*Group	0.03	1	0.03	0.00	0.98
Gender	20.25	1	20.25	0.40	0.55
Group*Gender	0.42	1	0.42	0.01	0.93
Block*Gender	1.50	1	1.50	0.03	0.87
Block*Group*Gender	58.80	1	58.80	1.15	0.31
Error	407.93	8	50.99		

Table 32

Mean Adjective Check List Scores Before and After Delivery (Need for Dominance)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	55.62	53.50
			SD	7.98	9.45
Control		10	M	55.70	49.90
			SD	5.72	4.70
Experimental		6	M	55.50	59.50
			SD	11.50	12.61
Men		8	M	55.25	54.25
			SD	4.20	11.87
Women		8	M	56.00	52.75
			SD	10.89	7.01
	men	5	M	53.80	49.00
			SD	3.70	4.06
Control					
	women	5	M	57.60	50.80
			SD	7.13	5.58
	men	3	M	57.67	63.00
			SD	4.51	16.64
Experimental					
	women	3	M	53.33	56.00
			SD	17.21	9.16

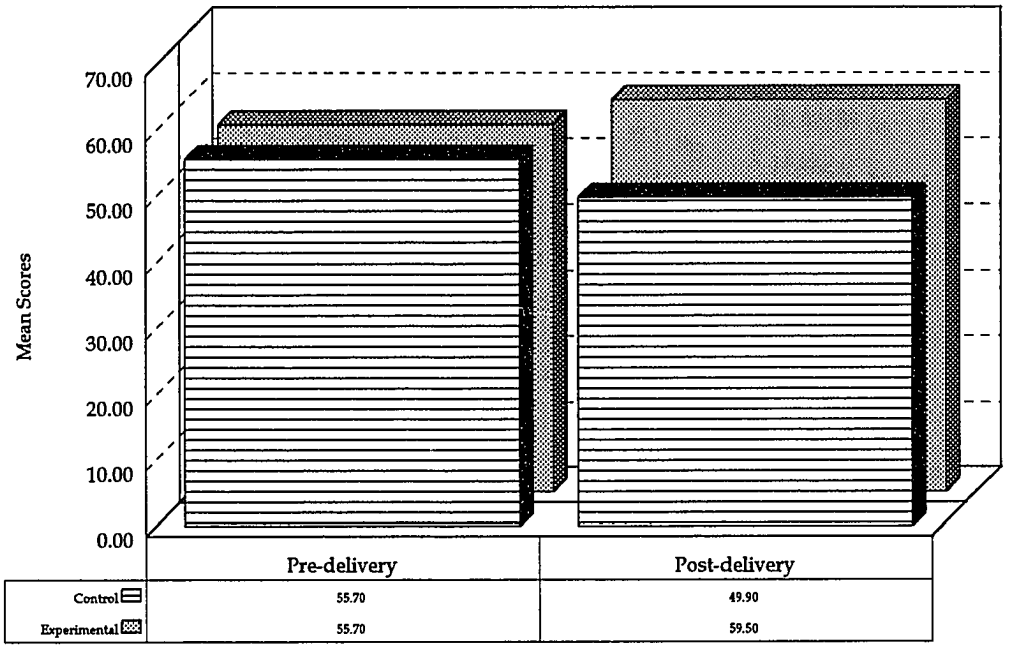

Figure 7. Mean scores of the Need for Dominance scale of the ACL before and after delivery by group.

Table 33

Effects of the Use of Active Imagery on the ACL Scale the Need for Endurance

Between Subjects					
Source	SS	DF	MS	F	P
Group	12.15	1	12.15	0.47	0.51
Block	57.04	1	57.04	2.21	0.17
Block*Group	1.01	1	1.01	0.04	0.85
Gender	90.25	1	90.25	3.49	0.10
Group*Gender	66.15	1	66.15	2.56	0.15
Block*Gender	35.04	1	35.04	1.36	0.28
Block*Group*Gender	15.41	1	15.41	0.60	0.46
Error	206.70	8	25.84		
Dependent Variable: Time 2					
Group	352.84	1	352.84	6.10	0.04
Block	2.04	1	2.04	0.04	0.85
Block*Group	99.01	1	99.01	1.71	0.23
Gender	248.06	1	248.06	4.29	0.07
Group*Gender	133.50	1	133.50	2.31	0.17
Block*Gender	51.04	1	51.04	0.88	0.37
Block*Group*Gender	52.01	1	52.01	0.90	0.37
Error	462.43	8	57.80		

(table continues)

Table 33 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	234.04	1	234.04	2.69	0.14
Block	80.67	1	80.67	0.93	0.36
Block*Group	80.03	1	80.03	0.92	0.36
Gender	39.06	1	39.06	0.45	0.52
Group*Gender	11.70	1	11.70	0.13	0.72
Block*Gender	1.50	1	1.50	0.02	0.90
Block*Group*Gender	10.80	1	10.80	0.12	0.73
Error	695.13	8	86.89		

Table 34

Mean Adjective Check List Scores Before and After Delivery (Need for Endurance)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	55.87	52.94
			SD	5.68	9.66
Control		10	M	55.20	49.30
			SD	5.47	4.81
Experimental		6	M	57.00	59.00
			SD	6.36	12.96
Men		8	M	58.25	56.87
			SD	4.89	11.56
Women		8	M	53.50	49.00
			SD	5.68	5.58
	men	5	M	56.00	51.00
			SD	4.95	6.44
Control					
	women	5	M	54.40	47.60
			SD	6.43	1.82
	men	3	M	62.00	66.67
			SD	1.00	12.42
Experimental					
	women	3	M	52.00	51.33
			SD	5.00	9.45

In the Need for Intraception scale (Tables 37 & 38), the need to seek explanations for behavior; and the Need for Nurturance (Tables 39 & 40), the need to provide comfort, no change over time was found. Both scales had a significant difference in couples (block) after delivery. The Need for Affiliation (Tables 41 & 42), the Need for Heterosexuality (Tables 43 & 44), and the Need for Exhibition (Tables 45 & 46), the need to be the center of attention demonstrated no change over time.

The Need for Autonomy (Tables 47 & 48), defined as the need to act independently, was found to change significantly in couple by gender after birth.

The Need for Aggression (Tables 49 & 50), the need to attack or hurt was uniformly if not significantly increased for all groups and genders after delivery. Women had higher levels than men at all times. No scores were abnormal.

The Need for Change responses (Tables 51 & 52) exhibited a significant change by couple and also by group. After delivery, the Control group had much lower scores while the Experimental group had a slight rise (Figure 8).

The Need for Succorance (Tables 53 & 54), the need to solicit support, was increased after delivery in the Control group, particularly in the women of this group. Significant change was found in the Control group and in women which had increased need for Succorance (see Figures 9 & 10). All scores were distributed around the mean. The couples factor interacted with both group and gender to result in change.

The Need for Abasement (Tables 55 & 56), representing submissiveness and self-criticism, was found to be uniformly at or below the mean. The Experimental group reduced this score after delivery, and the Control group increased it. This change over time is shown in Figure 11.

Table 35

Effects of the Use of Active Imagery on the ACL Scale Need for Order

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	26.00	1	26.00	0.77	0.41
Block	37.50	1	37.50	1.11	0.32
Block*Group	4.80	1	4.80	0.14	0.72
Gender	39.06	1	39.06	1.15	0.31
Group*Gender	36.04	1	36.04	1.06	0.33
Block*Gender	8.17	1	8.17	0.24	0.64
Block*Group*Gender	0.13	1	0.13	0.00	0.95
Error	270.73	8	33.84		
Dependent Variable: Time 2					
Group	424.00	1	424.00	5.02	0.05
Block	1.50	1	1.50	0.02	0.90
Block*Group	1.20	1	1.20	0.01	0.91
Gender	264.06	1	264.06	3.13	0.11
Group*Gender	82.84	1	82.84	0.98	0.35
Block*Gender	1.50	1	1.50	0.02	0.90
Block*Group*Gender	1.20	1	1.20	0.01	0.91
Error	675.13	8	84.39		

(table continues)

Table 35 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	240.00	1	240.00	2.95	0.12
Block	24.00	1	24.00	0.30	0.60
Block*Group	10.80	1	10.80	0.13	0.72
Gender	100.00	1	100.00	1.23	0.30
Group*Gender	9.60	1	9.60	0.12	0.74
Block*Gender	16.67	1	16.67	0.20	0.66
Block*Group*Gender	2.13	1	2.13	0.03	0.87
Error	650.80	8	81.35		

Table 36

Mean Adjective Check List Scores Before and After Delivery (Need for Order)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	54.19	52.68
			SD	5.31	9.84
Control		10	M	53.20	48.70
			SD	5.61	4.92
Experimental		6	M	55.83	59.33
			SD	4.75	12.72
Men		8	M	55.75	56.75
			SD	6.45	11.68
Women		8	M	52.62	48.62
			SD	3.62	5.75
	men	5	M	53.60	51.00
			SD	7.23	3.24
Control					
	women	5	M	52.80	46.40
			SD	4.27	5.55
	men	3	M	59.33	66.33
			SD	3.21	15.37
Experimental					
	women	3	M	52.33	52.33
			SD	3.05	4.62

Table 37

Effects of the Use of Active Imagery on the ACL Scale Need for Intraception

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	62.02	1	62.02	0.81	0.39
Block	222.04	1	222.04	2.90	0.13
Block*Group	7.01	1	7.01	0.09	0.77
Gender	380.25	1	380.25	4.97	0.06
Group*Gender	28.02	1	28.02	0.37	0.56
Block*Gender	117.04	1	117.04	1.53	0.25
Block*Group*Gender	1.01	1	1.01	0.01	0.91
Error	612.37	8	76.54		
Dependent Variable: Time 2					
Group	246.04	1	246.04	3.11	0.11
Block	759.37	1	759.37	9.61	0.01
Block*Group	16.87	1	16.87	0.21	0.66
Gender	495.06	1	495.06	6.26	0.04
Group*Gender	199.84	1	199.84	2.53	0.15
Block*Gender	5.04	1	5.04	0.06	0.81
Block*Group*Gender	18.41	1	18.41	0.23	0.64
Error	632.30	8	79.04		

(table continues)

Table 37 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	61.00	1	61.00	0.60	0.46
Block	160.17	1	160.17	1.57	0.24
Block*Group	2.13	1	2.13	0.02	0.89
Gender	7.56	1	7.56	0.07	0.79
Group*Gender	78.20	1	78.20	0.77	0.41
Block*Gender	73.50	1	73.50	0.72	0.42
Block*Group*Gender	10.80	1	10.80	0.11	0.75
Error	816.07	8	102.015		

Table 38

Mean Adjective Check List Scores Before and After Delivery (Need for Intraception)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	56.62	52.94
			SD	9.76	12.58
Control		10	M	55.10	49.90
			SD	11.51	14.18
Experimental		6	M	59.17	58.00
			SD	5.91	7.97
Men		8	M	61.50	58.50
			SD	8.02	12.00
Women		8	M	51.75	47.37
			SD	9.25	11.15
	men	5	M	61.00	58.20
			SD	9.46	15.09
Control					
	women	5	M	49.20	41.60
			SD	11.03	7.23
	men	3	M	62.33	59.00
			SD	6.66	6.93
Experimental					
	women	3	M	56.00	57.00
			SD	3.60	10.39

Table 39

Effects of the Use of Active Imagery on the ACL Scale Need for Nurturance

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	175.10	1	175.10	1.84	0.21
Block	48.17	1	48.17	0.50	0.50
Block*Group	40.83	1	40.83	0.43	0.53
Gender	39.06	1	39.06	0.41	0.54
Group*Gender	199.84	1	199.84	2.09	0.18
Block*Gender	170.67	1	170.67	1.79	0.22
Block*Group*Gender	48.13	1	48.13	0.50	0.50
Error	763.13	8	95.39		
Dependent Variable: Time 2					
Group	53.20	1	53.20	0.96	0.35
Block	360.37	1	360.37	6.52	0.03
Block*Group	63.07	1	63.07	1.14	0.32
Gender	264.06	1	264.06	4.77	0.06
Group*Gender	246.04	1	246.04	4.45	0.07
Block*Gender	51.04	1	51.04	0.92	0.36
Block*Group*Gender	35.21	1	35.21	0.64	0.45
Error	442.43	8	55.30		

(table continues)

Table 39 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	35.27	1	35.27	0.85	0.38
Block	145.04	1	145.04	3.50	0.10
Block*Group	2.41	1	10.80	0.06	0.81
Gender	100.00	1	100.00	2.41	0.16
Group*Gender	2.40	1	9.60	0.06	0.82
Block*Gender	35.04	1	16.67	0.84	0.38
Block*Group*Gender	1.01	1	2.13	0.02	0.88
Error	331.83	8	41.30		

Table 40

Mean Adjective Check List Scores Before and After Delivery (Need for Nurturance)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	54.06	52.31
			SD	9.95	10.05
Control		10	M	51.50	50.90
			SD	9.81	11.43
Experimental		6	M	58.33	54.67
			SD	9.42	7.55
Men		8	M	55.62	56.37
			SD	9.93	9.84
Women		8	M	52.50	48.25
			SD	10.39	9.05
	men	5	M	55.80	58.00
			SD	10.18	11.49
Control					
	women	5	M	47.20	43.80
			SD	8.17	6.02
	men	3	M	55.33	53.67
			SD	11.72	7.57
Experimental					
	women	3	M	61.33	55.67
			SD	7.57	9.07

Table 41

Effects of the Use of Active Imagery on the ACL Scale Need for Affiliation

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	232.06	1	232.06	2.91	0.13
Block	70.04	1	70.04	0.88	0.37
Block*Group	232.41	1	232.41	2.92	0.13
Gender	196.00	1	196.00	2.46	0.15
Group*Gender	0.27	1	0.27	0.00	0.95
Block*Gender	247.04	1	247.04	3.10	0.12
Block*Group*Gender	20.01	1	20.01	0.25	0.63
Error	637.17	8	79.64		
Dependent Variable: Time 2					
Group	410.82	1	410.82	8.16	0.02
Block	176.04	1	176.04	3.49	0.10
Block*Group	106.41	1	106.41	2.11	0.18
Gender	650.25	1	650.25	12.91	0.01
Group*Gender	88.82	1	88.82	1.76	0.22
Block*Gender	70.04	1	70.04	1.39	0.27
Block*Group*Gender	2.41	1	2.41	0.05	0.83
Error	402.97	8	50.37		

(table continues)

Table 41 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	25.35	1	25.35	0.37	0.56
Block	24.00	1	24.00	0.35	0.57
Block*Group	24.30	1	24.30	0.35	0.57
Gender	132.25	1	132.25	1.92	0.20
Group*Gender	798.35	1	79.35	1.15	0.31
Block*Gender	54.00	1	54.00	0.78	0.40
Block*Group*Gender	36.30	1	36.30	0.53	0.49
Error	552.20	8	69.02		

Table 42

Mean Adjective Check List Scores Before and After Delivery (Need for Affiliation)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	52.75	48.12
			SD	10.44	11.28
Control		10	M	49.80	44.20
			SD	10.61	11.51
Experimental		6	M	57.67	54.67
			SD	8.82	7.79
Men		8	M	56.25	54.50
			SD	9.47	9.97
Women		8	M	49.25	41.75
			SD	10.77	8.96
	men	5	M	53.40	52.40
			SD	10.78	11.01
Control					
	women	5	M	46.20	36.00
			SD	10.23	3.00
	men	3	M	61.00	58.00
			SD	5.20	8.72
Experimental					
	women	3	M	54.33	51.33
			SD	11.59	6.51

Table 43

Effects of the Use of Active Imagery on the ACL Scale Need for Heterosexuality

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	79.35	1	79.35	0.59	0.46
Block	181.50	1	181.50	1.36	0.28
Block*Group	554.70	1	554.70	4.15	0.07
Gender	25.00	1	25.00	0.19	0.68
Group*Gender	0.07	1	0.07	0.00	0.98
Block*Gender	0.00	1	0.00	0.00	1.00
Block*Group*Gender	58.80	1	58.80	0.44	0.52
Error	1068.33	8	133.54		
Dependent Variable: Time 2					
Group	473.20	1	473.20	11.65	0.01
Block	45.37	1	45.37	1.12	0.32
Block*Group	261.07	1	261.07	6.43	0.03
Gender	27.56	1	27.56	0.68	0.43
Group*Gender	105.34	1	105.34	2.59	0.14
Block*Gender	12.04	1	12.04	0.30	0.60
Block*Group*Gender	190.01	1	190.01	4.68	0.06
Error	324.83	8	40.60		

(table continues)

Table 43 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	165.00	1	165.00	2.21	0.17
Block	408.37	1	408.37	5.48	0.05
Block*Group	54.67	1	54.67	0.73	0.42
Gender	105.06	1	105.06	1.41	0.27
Group*Gender	110.70	1	110.70	1.49	0.26
Block*Gender	12.04	1	12.04	0.16	0.70
Block*Group*Gender	37.41	1	37.41	0.50	0.50
Error	596.17	8	74.52		

Table 44

Mean Adjective Check List Scores Before and After Delivery (Need for Heterosexuality)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	50.62	50.31
			SD	11.45	9.80
Control		10	M	48.90	46.10
			SD	10.37	7.05
Experimental		6	M	53.50	57.33
			SD	13.56	10.19
Men		8	M	49.37	51.62
			SD	9.96	5.70
Women		8	M	51.87	49.00
			SD	13.36	13.00
	men	5	M	47.60	49.40
			SD	8.96	5.41
Control					
	women	5	M	50.20	42.80
			SD	12.56	7.43
	men	3	M	52.33	55.33
			SD	12.86	4.72
Experimental					
	women	3	M	54.67	59.33
			SD	17.04	15.01

Table 45

Effects of the Use of Active Imagery on the ACL Scale Need for Exhibition

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	5.70	1	5.70	0.10	0.76
Block	28.17	1	28.17	0.49	0.50
Block*Group	6.53	1	6.53	0.11	0.74
Gender	150.06	1	150.06	2.58	0.15
Group*Gender	15.50	1	15.50	0.27	0.62
Block*Gender	10.67	1	10.67	0.18	0.68
Block*Group*Gender	0.83	1	0.83	0.01	0.91
Error	464.47	8	58.06		
Dependent Variable: Time 2					
Group	16.54	1	16.54	0.46	0.52
Block	0.37	1	0.37	0.01	0.92
Block*Group	9.07	1	9.07	0.25	0.63
Gender	60.06	1	60.06	1.67	0.23
Group*Gender	5.70	1	5.70	0.16	0.70
Block*Gender	0.37	1	0.37	0.01	0.92
Block*Group*Gender	16.87	1	16.87	0.47	0.51
Error	287.43	8	35.93		

(table continues)

Table 45 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	2.82	1	2.82	0.20	0.66
Block	35.04	1	35.04	2.50	0.15
Block*Group	0.21	1	0.21	0.01	0.91
Gender	20.25	1	20.25	1.44	0.26
Group*Gender	40.02	1	40.02	2.85	0.13
Block*Gender	7.04	1	7.04	0.50	0.50
Block*Group*Gender	10.21	1	10.21	0.73	0.42
Error	112.17	8	14.02		

Table 46

Mean Adjective Check List Scores Before and After Delivery (Need for Exhibition)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	48.44	48.81
			SD	6.74	5.14
Control		10	M	48.90	49.60
			SD	6.66	5.72
Experimental		6	M	47.67	47.50
			SD	7.45	4.13
Men		8	M	45.37	46.87
			SD	7.01	4.67
Women		8	M	51.50	50.75
			SD	5.18	5.12
	men	5	M	46.60	47.20
			SD	8.11	5.07
Control					
	women	5	M	51.20	52.00
			SD	4.55	5.79
	men	3	M	43.33	46.33
			SD	5.51	4.93
Experimental					
	women	3	M	52.00	48.67
			SD	7.21	3.78

Table 47

Effects of the Use of Active Imagery on the ACL Scale Need for Autonomy

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	10.00	1	10.00	0.14	0.71
Block	126.04	1	126.04	1.80	0.22
Block*Group	15.41	1	15.41	0.22	0.65
Gender	68.06	1	68.06	0.97	0.35
Group*Gender	199.84	1	199.84	2.86	0.13
Block*Gender	100.04	1	100.04	1.43	0.26
Block*Group*Gender	122.01	1	122.01	1.75	0.22
Error	559.03	8	69.88		
Dependent Variable: Time 2					
Group	18.15	1	18.15	0.18	0.68
Block	66.67	1	66.67	0.67	0.44
Block*Group	0.03	1	0.03	0.00	0.98
Gender	16.00	1	16.00	0.16	0.70
Group*Gender	9.60	1	9.60	0.10	0.76
Block*Gender	8.17	1	8.17	0.08	0.78
Block*Group*Gender	34.13	1	34.13	0.34	0.57
Error	801.00	8	100.12		

(table continues)

Table 47 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	55.10	1	55.10	2.37	0.16
Block	9.37	1	9.37	0.40	0.54
Block*Group	16.87	1	16.87	0.72	0.42
Gender	18.06	1	18.06	0.78	0.40
Group*Gender	121.84	1	121.84	5.23	0.05
Block*Gender	165.37	1	165.37	7.10	0.03
Block*Group*Gender	27.07	1	27.07	1.16	0.31
Error	186.23	8	23.28		

Table 48

Mean Adjective Check List Scores Before and After Delivery (Need for Autonomy)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	48.18	47.62
			SD	8.94	7.97
Control		10	M	49.80	46.80
			SD	9.52	6.46
Experimental		6	M	48.17	49.00
			SD	8.66	10.58
Men		8	M	47.12	46.62
			SD	9.90	7.61
Women		8	M	51.25	48.62
			SD	7.98	8.72
	men	5	M	45.00	45.20
			SD	10.65	7.95
Control					
	women	5	M	54.60	48.40
			SD	5.73	4.93
	men	3	M	50.67	49.00
			SD	9.29	7.94
Experimental					
	women	3	M	45.67	49.00
			SD	9.07	14.73

Table 49

Effects of the Use of Active Imagery on the ACL Scale Need for Aggression

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	112.07	1	112.07	1.19	0.31
Block	165.37	1	165.37	1.76	0.22
Block*Group	27.07	1	27.07	0.29	0.61
Gender	169.00	1	169.00	1.80	0.22
Group*Gender	56.07	1	56.07	0.60	0.46
Block*Gender	108.37	1	108.37	1.15	0.31
Block*Group*Gender	114.07	1	114.07	1.21	0.30
Error	752.97	8	94.12		
Dependent Variable: Time 2					
Group	28.70	1	28.70	0.24	0.63
Block	228.17	1	228.17	1.94	0.20
Block*Group	8.53	1	8.53	0.07	0.79
Gender	232.56	1	232.56	1.98	0.20
Group*Gender	139.54	1	139.54	1.19	0.31
Block*Gender	24.00	1	24.00	0.20	0.66
Block*Group*Gender	50.70	1	50.70	0.43	0.53
Error	940.73	8	117.59		

(table continues)

Table 49 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	27.34	1	27.34	0.51	0.49
Block	5.04	1	5.04	0.09	0.77
Block*Group	5.21	1	5.21	0.10	0.76
Gender	5.06	1	5.06	0.09	0.77
Group*Gender	18.70	1	18.70	0.35	0.57
Block*Gender	30.37	1	30.37	0.57	0.47
Block*Group*Gender	12.67	1	12.67	0.24	0.64
Error	428.03	8	53.50		

Table 50

Mean Adjective Check List Scores Before and After Delivery (Need for Aggression)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	47.25	50.06
			SD	10.02	10.50
Control		10	M	49.30	51.10
			SD	10.19	10.31
Experimental		6	M	43.83	48.33
			SD	9.58	11.55
Men		8	M	44.00	46.25
			SD	10.21	11.18
Women		8	M	50.50	53.87
			SD	9.30	8.82
	men	5	M	44.60	45.00
			SD	10.71	11.02
Control					
	women	5	M	54.00	57.20
			SD	7.97	4.97
	men	3	M	43.00	48.33
			SD	11.53	13.58
Experimental					
	women	3	M	44.67	48.33
			SD	9.71	12.22

Table 51

Effects of the Use of Active Imagery on the ACL Scale Need for Change

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	238.00	1	238.00	8.46	0.02
Block	13.50	1	13.50	0.48	0.51
Block*Group	67.50	1	67.50	2.40	0.16
Gender	7.56	1	7.56	0.27	0.62
Group*Gender	21.00	1	21.00	0.75	0.41
Block*Gender	4.17	1	4.17	0.15	0.71
Block*Group*Gender	17.63	1	17.63	0.63	0.45
Error	225.07	8	28.13		
Dependent Variable: Time 2					
Group	14.02	1	14.02	0.51	0.49
Block	253.50	1	253.50	9.23	0.02
Block*Group	76.80	1	76.80	2.80	0.13
Gender	0.00	1	0.00	0.00	1.00
Group*Gender	0.27	1	0.27	0.01	0.92
Block*Gender	42.67	1	42.67	1.55	0.25
Block*Group*Gender	20.83	1	20.83	0.76	0.41
Error	219.67	8	27.46		

(table continues)

Table 51 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	367.54	1	367.54	7.41	0.03
Block	384.00	1	384.00	7.74	0.02
Block*Group	0.30	1	0.30	0.01	0.94
Gender	7.56	1	7.56	0.15	0.71
Group*Gender	26.00	1	26.00	0.52	0.49
Block*Gender	73.50	1	73.50	1.48	0.26
Block*Group*Gender	76.80	1	76.80	1.55	0.25
Error	396.73	8	49.59		

Table 52

Mean Adjective Check List Scores Before and After Delivery (Need for Change)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	46.81	42.62
			SD	6.29	6.47
Control		10	M	49.80	41.90
			SD	4.71	7.85
Experimental		6	M	41.83	43.83
			SD	5.60	3.43
Men		8	M	47.50	42.62
			SD	4.75	8.83
Women		8	M	46.12	42.62
			SD	7.83	3.42
	men	5	M	49.60	42.00
			SD	4.33	11.04
Control					
	women	5	M	50.00	41.80
			SD	5.57	4.09
	men	3	M	44.00	43.67
			SD	3.46	5.13
Experimental					
	women	3	M	39.67	44.00
			SD	7.23	1.73

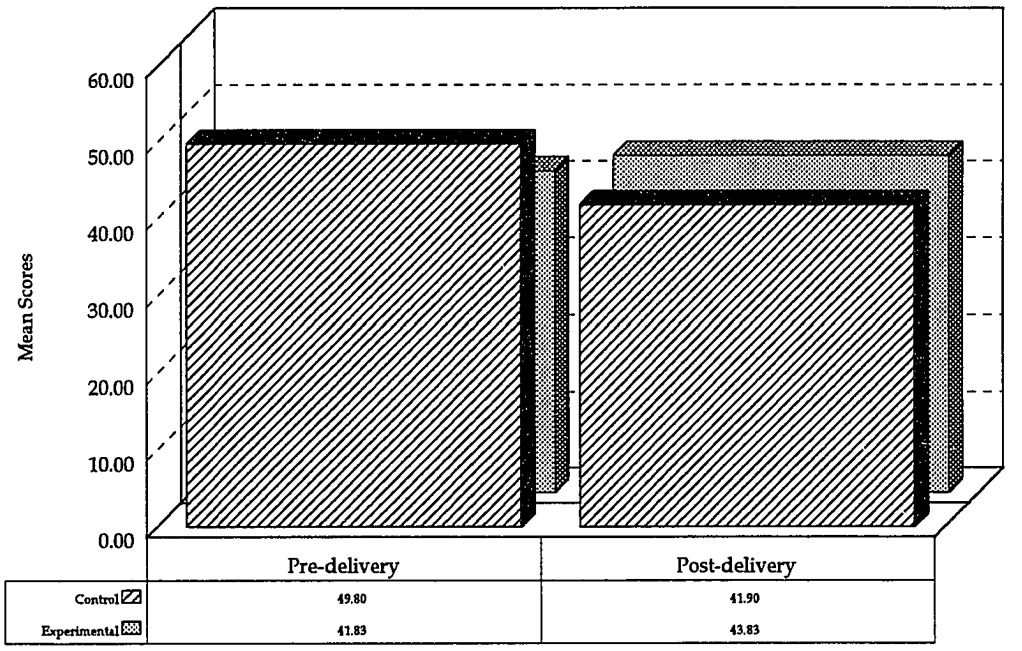

Figure 8. Mean scores of the Need for Change scale of the ACL before and after delivery by group.

Table 53

Effects of the Use of Active Imagery on the ACL Scale Need for Succorance

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	15.00	1	15.00	1.03	0.34
Block	35.04	1	35.04	2.41	0.16
Block*Group	11.41	1	11.41	0.79	0.40
Gender	49.00	1	49.00	3.38	0.10
Group*Gender	5.40	1	5.40	0.37	0.56
Block*Gender	2.04	1	2.04	0.14	0.72
Block*Group*Gender	99.01	1	99.01	6.82	0.03
Error	116.10	8	14.51		
Dependent Variable: Time 2					
Group	116.20	1	116.20	5.20	0.05
Block	42.67	1	42.67	1.91	0.20
Block*Group	197.63	1	197.63	8.84	0.02
Gender	280.56	1	280.56	12.55	0.01
Group*Gender	21.00	1	21.00	0.94	0.36
Block*Gender	0.17	1	0.17	0.01	0.93
Block*Group*Gender	3.33	1	3.33	0.15	0.71
Error	178.87	8	22.36		

(table continues)

Table 53 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	214.70	1	214.70	21.32	<0.01
Block	0.37	1	0.37	0.04	0.85
Block*Group	114.07	1	114.07	11.33	0.01
Gender	95.06	1	95.06	9.44	0.01
Group*Gender	5.10	1	5.10	0.51	0.50
Block*Gender	3.37	1	3.37	0.34	0.58
Block*Group*Gender	138.67	1	138.67	13.77	<0.01
Error	80.57	8	10.07		

Table 54

Mean Adjective Check List Scores Before and After Delivery (Need for Succorance)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	43.25	44.81
			SD	4.71	7.48
Control		10	M	42.50	46.90
			SD	4.20	5.11
Experimental		6	M	44.50	41.33
			SD	5.65	9.89
Men		8	M	41.50	40.62
			SD	4.10	7.46
Women		8	M	45.00	49.00
			SD	4.87	4.93
	men	5	M	41.20	43.60
			SD	4.97	4.45
Control					
	women	5	M	43.80	50.20
			SD	3.27	3.42
	men	3	M	42.00	35.67
			SD	3.00	9.81
Experimental					
	women	3	M	47.00	47.00
			SD	7.21	7.21

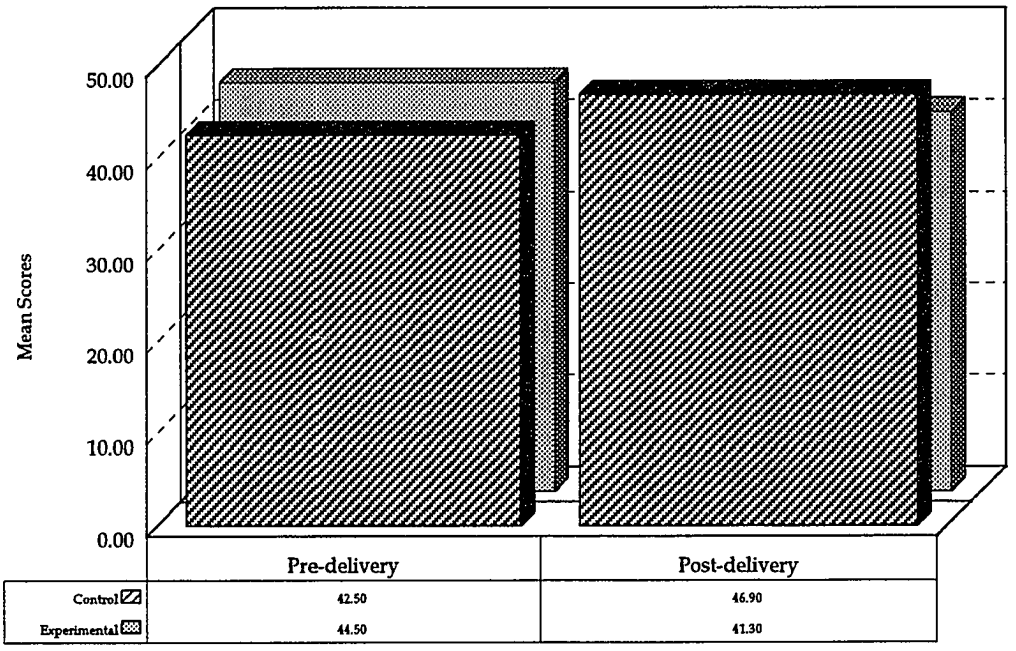

Figure 9. Mean scores of the Need for Succorance scale of the ACL before and after delivery by group.

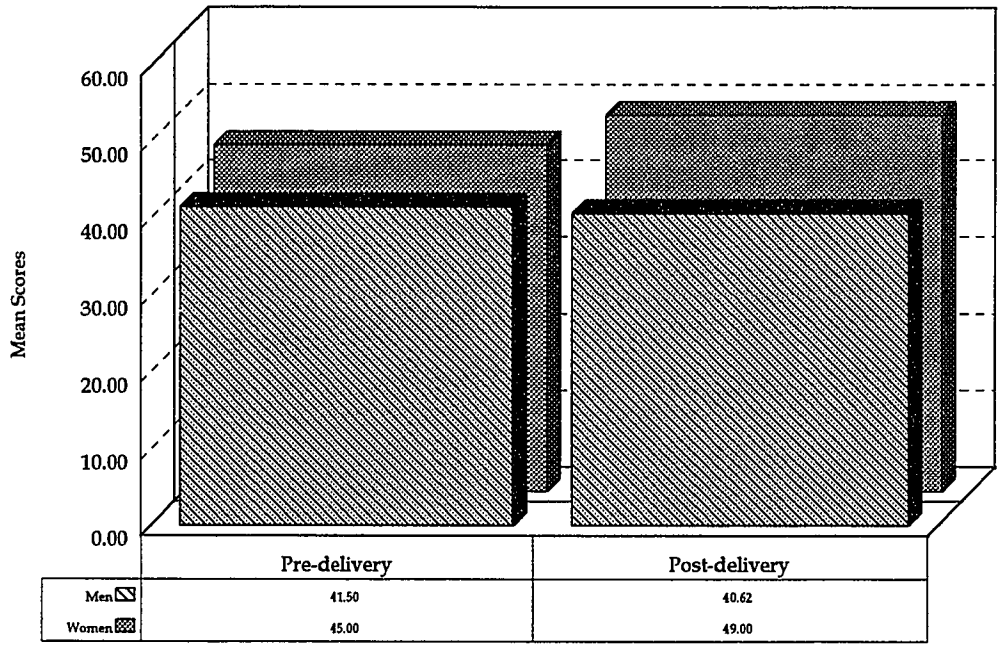

Figure 10. Mean scores of the Need for Succorance scale of the ACL before and after delivery by gender.

Table 55

Effects of the Use of Active Imagery on the ACL Scale Need for Abasement

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	60.00	1	60.00	0.54	0.48
Block	100.04	1	100.04	0.91	0.37
Block*Group	1.41	1	1.41	0.01	0.91
Gender	6.25	1	6.25	0.06	0.82
Group*Gender	126.15	1	126.15	1.14	0.32
Block*Gender	30.37	1	30.37	0.28	0.61
Block*Group*Gender	102.67	1	102.67	0.93	0.36
Error	883.10	8	110.39		
Dependent Variable: Time 2					
Group	119.00	1	119.00	0.99	0.35
Block	18.37	1	18.37	0.15	0.71
Block*Group	27.07	1	27.07	0.22	0.65
Gender	1.56	1	1.56	0.01	0.91
Group*Gender	69.34	1	69.34	0.58	0.47
Block*Gender	30.37	1	30.37	0.25	0.63
Block*Group*Gender	9.07	1	9.07	0.08	0.79
Error	963.63	8	120.45		

(table continues)

Table 55 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	348.00	1	348.00	7.43	0.03
Block	32.67	1	32.67	0.70	0.43
Block*Group	40.83	1	40.83	0.87	0.38
Gender	14.06	1	14.06	0.30	0.60
Group*Gender	8.44	1	8.44	0.18	0.68
Block*Gender	0.00	1	0.00	0.00	1.00
Block*Group*Gender	50.70	1	50.70	1.08	0.33
Error	374.73	8	46.84		

Table 56

Mean Adjective Check List Scores Before and After Delivery (Need for Abasement)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	44.50	46.19
			SD	9.34	9.09
Control		10	M	43.00	48.30
			SD	10.19	7.77
Experimental		6	M	47.00	42.67
			SD	7.95	10.73
Men		8	M	45.12	45.87
			SD	7.90	7.81
Women		8	M	43.87	46.50
			SD	11.12	10.76
	men	5	M	45.80	49.60
			SD	9.60	3.65
Control					
	women	5	M	40.20	47.00
			SD	11.03	10.88
	men	3	M	44.00	39.67
			SD	5.57	9.71
Experimental					
	women	3	M	50.00	45.67
			SD	10.00	12.90

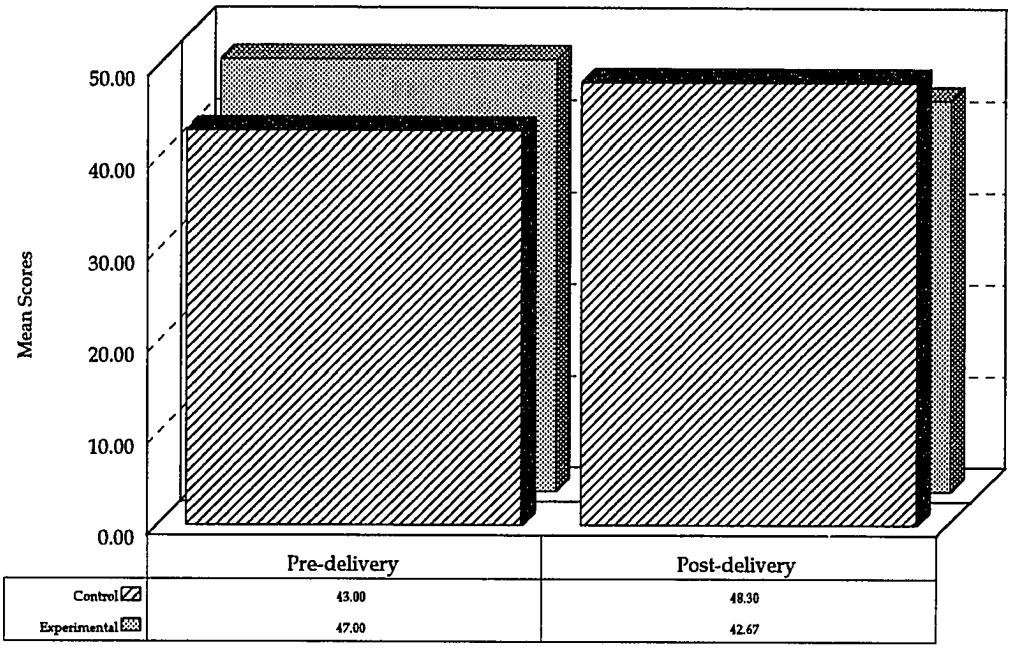

Figure 11. Mean scores of the Need for Abasement scale of the ACL before and after delivery by group.

The Need for Deference (Tables 57 & 58), the need to be self-effacing, was significantly changed after delivery in couple by gender.

Discussion

In assessing the responses of the participating subjects to the ACL, all were clustered at the mean or within one standard deviation from it. No responses were abnormal. All described normal personalities. Significant change over time after the experience of labor and delivery was found in the following scales: Favorable, Self-confidence, and the Needs for Achievement, Dominance, Autonomy, Change, Succorance, Abasement, and Deference. Increased sample size and replication is warranted to assess the validity of the findings in this sample.

It was predicted that the use of active imagery would engender feelings of greater control and self empowerment in the Experimental group due to the experience of control during the labor process. In discussion of those scales with significant change, the number of Favorable adjectives rose after the use of imagery by the experimental group and decreased in the Control group. Self-confidence decreased in the Control group while increasing slightly in the Experimental group. These were consistent with the hypothesis of increased self-satisfaction.

The Need for Achievement scale describes internally motivated individuals who are intellectually involved. The Imagery group's responses rose while those who did not use imagery had lower responses after delivery. The Need for

Table 57

Effects of the Use of Active Imagery on the ACL Scale Need for Deference

Source	SS	DF	MS	F	P
Dependent Variable: Time 1					
Group	60.00	1	60.00	0.77	0.41
Block	384.00	1	384.00	4.91	0.06
Block*Group	67.50	1	67.50	0.86	0.38
Gender	30.25	1	30.25	0.39	0.55
Group*Gender	46.82	1	46.82	0.60	0.46
Block*Gender	121.50	1	121.50	1.55	0.25
Block*Group*Gender	30.00	1	30.00	0.38	0.55
Error	625.93	8	78.24		
Dependent Variable: Time 2					
Group	3.75	1	3.75	0.03	0.87
Block	80.67	1	80.67	0.61	0.45
Block*Group	5.63	1	5.63	0.04	0.84
Gender	156.25	1	156.25	1.18	0.31
Group*Gender	25.35	1	25.35	0.19	0.67
Block*Gender	1.50	1	1.50	0.01	0.92
Block*Group*Gender	43.20	1	43.20	0.33	0.58
Error	1061.40	8	132.67		

(table continues)

Table 57 (continued)

Source	SS	DF	MS	F	P
Dependent Variable: Change (Time 1 to Time 2)					
Group	93.75	1	93.75	3.95	0.08
Block	112.67	1	112.67	4.75	0.06
Block*Group	34.13	1	34.13	1.44	0.26
Gender	49.00	1	49.00	2.07	0.19
Group*Gender	3.27	1	3.27	0.14	0.72
Block*Gender	150.00	1	150.00	6.32	0.04
Block*Group*Gender	1.20	1	1.20	0.05	0.83
Error	189.73	8	23.72		

Table 58

Mean Adjective Check List Scores Before and After Delivery (Need for Deference)

Group	Gender	n		Pre-delivery	Post-delivery
ALL		16	M	50.00	49.12
			SD	9.54	9.58
Control		10	M	48.50	49.50
			SD	10.11	8.09
Experimental		6	M	52.50	48.50
			SD	8.78	12.53
Men		8	M	51.37	52.25
			SD	11.25	9.63
Women		8	M	48.62	46.00
			SD	8.02	9.04
	men	5	M	51.20	53.60
			SD	12.70	6.69
Control					
	women	5	M	45.80	45.40
			SD	7.12	7.76
	men	5	M	51.67	50.00
			SD	10.97	14.93
Experimental					
	women	5	M	53.33	47.00
			SD	8.39	12.77

Dominance refers to the need to be assertive and forthright. This scale changed by couple and by group after delivery. Control and Experimental groups began with equal scores in pregnancy. After the birth, the Control group means decreased and the Experimental group means increased. The Need for Autonomy scale demonstrated a change in the couple x gender interaction. Men's responses remained the same while Control women dropped in their need to act independently and Experimental women responded more assertively. While this does represent a change and is supportive of the hypothesis, all scores were normal and clustered about the mean. These three scales draw from similar adjectives.

Likewise, the Need for Change, the desire for the novel, adventure, and the challenging, changed in the couples and by group. The Control group's initially higher scores decreased. They appeared to become more tentative and less liable to take risks. The Experimental group showed a small increase. The results would seem to indicate some preservation of the appreciation of spontaneity which was damaged in the Control group.

The subject's Need for Succorance underwent multiple significant changes. This scale describes emotional immaturity and dependence. Group change indicated an increase in the Control group and a decrease in the Imagery group. Furthermore, while women became more dependent after delivery, this was due totally to Control group women. The Experimental group women exhibited no change in scores. The linking of the couples influenced interactions with group and gender. The etiology of this finding could be protection of Imagery group mothers' independence, while the birth experience resulted in less confidence in the Control mothers. Furthermore, the Need for Abasement similarly increased

in the Control group indicating self-doubt, and decreased in the Experimental group after delivery. Finally, the Need for Deference, also a desire to seek subordinate roles, was changed in the couple x gender interaction. Scores of Control group women remained stable while scores of Experimental group women decreased. All three of these scales draw from similar adjectives and are consistent with the projected effect of imagery as a means of increasing control and self-satisfaction.

The following findings are instructive. Differences were found between groups before and/or after delivery but these did not change over time. The Need for Endurance includes attributes of responsibility and idealism. The person "may find himself championing unconventional ideas" (Gough & Heilbrun, 1965, p. 7). This is the precise definition of the person who might participate in research. The Imagery group reported greater Need for Endurance after delivery. The major increase in this scale for the Experimental group men in the face of decreases for all other groups, may be indicative of a new feeling of control in this labor experience. This was not significantly changed from pre-delivery levels.

Personal Adjustment was greater in the Experimental group after delivery. Neither group had results indicating low personal adjustment. The direct causes of these feelings are elusive. Fatigue and concern with child rearing may have affected these responses which were elicited on the average three to four weeks after delivery. The finding was that of all groups and genders, the one which had higher responses on the Personal Adjustment scale was the Experimental women. This was not demonstrated as a significant change over time. As was predicted, the use of imagery seemed to increase the positive attitude of these

mothers. Due to the extremely small size of this group, replication of this study is needed to ascertain if this feeling is consistently gained.

The need to act independently, expressed as the Need for Autonomy, was decreased for men more than women after the delivery. The initially higher level of the Control group women decreased as Experimental women expressed increased feelings of autonomy. This is supportive of the predicted feelings of autonomy after the use of active imagery.

All these findings were consistent with hypothesized outcomes. As mentioned earlier, the construction of the ACL scales is such that many scales load from the same adjectives and often overlap between scales occurs (Fekken, 1984). While the ACL is frequently used to describe personality attributes for normal populations, as has been done here, its ability to describe a single construct is limited. General characteristics for the groups can be outlined. This is useful as a broad description of the two groups before and after the delivery, but is not very specific. Many of the results are intuitively logical and offer no real surprises.

The ACL has measured differences in personality responses after the labor and delivery. These differences in the experimental group are due not only to the birth itself, as experienced by the Control group, but also by the use of active imagery. All post-delivery scores are consistent with the hypothesized increase in feelings of self worth and feelings of control predicted after the use of imagery. While this instrument can provide only a general description of personality, the results found are consistent with predicted directions. Increasing the power of the test through greater subject numbers is needed to support these results in larger populations.

Vividness of Imagery

The fifth research question asked, "What is the relationship between success in labor and delivery (by either subjective or objective criteria) and the mother's vividness of imagery?" A statistical relationship could not be calculated as all three mothers who completed the imagery assessment had equally "successful" labors. There was no quantifiable difference in these mothers' labors. Sample size should be at least five subjects for each category of each variable (Brink & Wood, 1983). This was not possible with this group.

Questionnaire Upon Mental Imagery

Some researchers have questioned whether vividness actually represents a better ability to use imagery (Anderson, 1981). Sheehan (1966b) has demonstrated that subjects vary in their ability to image to the same degree that they vary in their ability to perceive. The more vivid the image, the better able the subject is to perform a behavioral task on the basis of the image (Sheehan, 1966a). Sheehan (1967a) has developed a questionnaire which elicits a multisensory assessment of vividness. There are some methodological problems with the pencil and paper quantification of an internal event. The subject's facility with the format and the fact that it is difficult to reduce a multidimensional experience to a limited venue restricts the data which can be obtained. Nevertheless, the shortened form of the QMI remains the standard for imagery assessment.

Purpose

The purpose of this section of the study was to ascertain the quality of vividness in women who used active imagery for their labor and delivery.

Hypothesis

An experimental hypothesis was not appropriate for this level of inquiry. The research question, "What is the level of vividness in the imagery group mothers?" directed the study.

Method

Subjects. The subjects were the three mothers who used active imagery in labor and delivery and completed the Questionnaire Upon Mental Imagery (QMI).

Design. A shortened form of Bett's Questionnaire Upon Mental Imagery was used. This shortened form of the original 150 question scale is the most frequently used imagery assessment tool. Requiring 10 minutes to administer, the tool reliably measures the ability to image in various sensory modalities . As a measure of vividness the modified QMI is excellent ($r = 0.92$ and $r = 0.98$) in correlations with Bett's Questionnaire (Sheehan, 1967a). Sheehan's (1967b) scoring extends from:

1 - perfectly clear and as vivid as the actual experience

2 - very clear and comparable in vividness to the actual experience

3 - moderately clear and vivid

4 - not clear or vivid but recognizable

5 - vague and dim

6 - so vague and dim as to be hardly discernible

7 - no image present at all (p.1)

Subjects are requested to rate their ability to image in seven sensory categories. Thus, they accumulate scores in each of the sensory areas and a total score. The lower the score, the more vivid the imagery is rated.

Procedure. The experimental group was assessed for the vividness of its imagery by using Sheehan's (1967b) QMI. Mothers were asked to complete this tool when they completed the other post-delivery instruments.

Results

All the women in the imagery group demonstrated clear imagery ratings as are summarized in Table 59. As with all individuals, their ability in differing sensory areas varied. All images were rated at least "moderately clear and vivid" (Sheehan, 1967b, p.1).

Table 59

Summary of Vividness Scores

Variable	Subject 1	Subject 2	Subject 3	M
Visual	2	2.8	3.2	2.67
Auditory	1.6	3	3.8	2.80
Cutaneous	2.2	2	3.4	2.50
Kinesthetic	2.4	2.4	3.2	2.67
Gustatory	3	2	4	3.00
Olfactory	3.4	2	3.2	2.87
Organic	2.4	2	2.6	2.33
Total	2.42	2.31	3.34	2.69

Discussion

All women in the imagery group rated their labors as successful. With a larger sample and a more objective method of determining "success" in labor, the relationship between imagery vividness and successful labor could be more explicitly determined. A larger group would provide the power necessary to draw conclusions. The use of imagery worked for these women and appears to have provided a control mechanism which allowed the mother direct control of bodily processes through mental operation. These randomly selected individuals were able to image with sufficient clarity to impact their conduct of their labor. Their internal assessment of the vividness of their imagery, was satisfactory and effective. For these women, the use of imagery fostered a successful labor and delivery experience. It would be instructive to assess the level of imagery vividness for mothers not in the experimental group, as well as all fathers.

Qualitative Analysis

Subjective comments from the Experimental group mothers concerning their feelings about the use of imagery as a labor strategy were requested. Statements such as these were made: "I recommended it (the use of imagery) to other people." "I used it in labor, but especially I used it for breast feeding." "It helped. I think it did. It made you think that you can do something. You are in control. It gave me some feeling of being in control." One woman subsequently related how she had used imagery for pain control for a postpartum gall bladder attack and surgery. Another individual reported

returning to graduate nursing school with an appreciation of alternative therapies of pain control and a commitment to using them for intervention with her patients.

Summary

In summary, in the antenatal period, psychological studies revealed differences between men and women. Subjects in this study in the third trimester of pregnancy demonstrated no gender differences in either State or Trait anxiety as measured on the STAI. All participants reported being primarily Internally controlled. Comparatively, men reported greater feelings of Internal control, and women greater feelings of control by Powerful Others in this sample's responses to Levenson's Locus of Control scales and the PAI. Control by Chance was not significantly different for either gender. Self-assessment of personality on the Adjective Check List revealed no significant differences in the genders at this time of pregnancy. This effort is significant in that it provided a baseline assessment and the first clinical study of the father's response to the third trimester of pregnancy.

After delivery, assessment of the impact of the use of active imagery on the psychological status of the fathers and mothers revealed the following results. Although all levels were low, an increase in State anxiety was found for all groups (men, women, control, and experimental). Also, a reduction of Trait anxiety in the Experimental group and an increase in the Control group was found after delivery. However, none of these findings were statistically significant differences.

Determination of Locus of Control revealed that all couples described themselves as primarily Internally controlled. A significant change occurred in the responses of couples, however, no other changes in group or gender were found over time.

The Control group and the women both reported feeling more controlled by Powerful Others before and after the birth. This difference did not change over time.

Chance was significantly higher after delivery in the Control group compared to the Experimental group. This increase above the test mean could represent a lack of control in the birthing process precipitated by the absence of a means of coping.

The predictions of the hypotheses were supported: imagery group couples reported feeling internally controlled and less controlled by the external factor of Chance than did the Control group. The goal of active imagery, to actively involve the parents in the labor and delivery and to allow the mother to be proactive rather than reactive, has resulted in feelings of greater self worth and control. Replication with a larger sample is needed to affirm these results. No findings ran counter to predictions and, although a further increase in internal control was expected, the findings support the picture of more useful control through the use of imagery.

The ACL assessment found significant differences between the scores of the Control group as compared to the Experimental group after delivery. The responses to the ACL described imagery group parents as feeling better about themselves (Favorable), involved in themselves, internally motivated, direct and persevering (Self-confidence, Need for Achievement, and Dominance). They

appreciated the new (Need for Change), and had less need to seek support or sympathy (Needs for Abasement and Succorance). The picture is consistent of and internally motivated mature individual who can cope with challenge. This is congruent with the predicted effects of imagery which can offer a means of coping during labor and delivery while preserving psychological well-being. All mothers who used active imagery in their labor and delivery experiences reported moderately high degrees of imagery vividness as measured on the shortened QMI. This represents the first exploration of the psychological sequelae of the use of imagery in labor and delivery.

Physiological Studies

What is the relationship between coping strategies and the physiology and outcome of labor and delivery? This second research question seeks to determine if the use of active imagery as a coping strategy affects the duration of labor, maternal vital signs, Apgar score of the baby, and umbilical cord blood gases as outcome measures. Justification of each of these parameters is addressed in the respective sections.

Labor

The use of active imagery has been shown to alter physiology. As discussed earlier, neuronal and humoral mechanisms can mediate changes in organ systems. Mental rehearsal of the birthing process was intended to act both as a mental and a physical repetition. The intent of the imagery was to cause actual physical alteration, such as cervical dilatation and muscular relaxation (to reduce atony) at the time of delivery. The tape cautioned that birth was not to happen at the time of practice, but rather when the baby was ready. Practice increased familiarity with the process in the hypometabolic, relaxed state. The intent in observing the progress in labor was to measure the effectiveness of the physiologic change. Friedman's (1970) labor curve was employed as the unit of measurement because, at the inception of the study, this was the standard of practice. The labor curve described by Friedman is a sigmoid curve. On closer inspection only a brief portion of the curve can be

described as having a slope of 1.5 in the model (see Appendix A). The intent of the Friedman model was to graphically chart continued progression of labor to allow clinical management of the mother in practice (Friedman, 1970). Its use as a research tool was apparently not the purpose. In addition, statistical comparison of the sigmoid curves was problematic. Therefore, it was decided to compare elapsed time in labor from 7-10 cms dilatation. This is well into the active phase and represents the dynamic forces of labor.

Purpose

The purpose of this section of the study was to determine if the subjects who used active imagery during their labor and delivery period had statistically significantly reduced duration of labor.

Hypotheses

Ho-1: There is no difference in duration of labor from 7 to 10 cm dilatation in mothers who used active imagery as compared to those mothers who did not.

Ha-1: There is a difference in duration (less) of labor from 7 to 10 cm dilatation in mothers who used active imagery as compared to those mothers who did not.

Method

Subjects. The subjects tested were the six mothers who used active imagery in labor (experimental) compared to eight mothers who did not (control).

Design. This experimental design sought to determine if there was a difference between the duration of labor from 7-10 cm experienced by the two groups of mothers.

Procedure. Duration of labor and dilatation values were extracted from inpatient records by the investigator. These were then graphed (see Figure 12 and Figure 13). The median test was used to test the null hypothesis that there was no difference between the two samples represented by the two medians (Daniel, 1990). An alpha level of 0.05 was used for this test. Medians were determined by using Excel Version 4.0 statistical software (Microsoft, 1992). The median test was calculated according to the formula:

$$T = \frac{(A/n_1) - (B/n_2)}{\sqrt{p(1 - p)(1/n_1 + 1/n_2)}}$$

where $p = (A + B)/N$ (Daniel, 1990, p. 86).

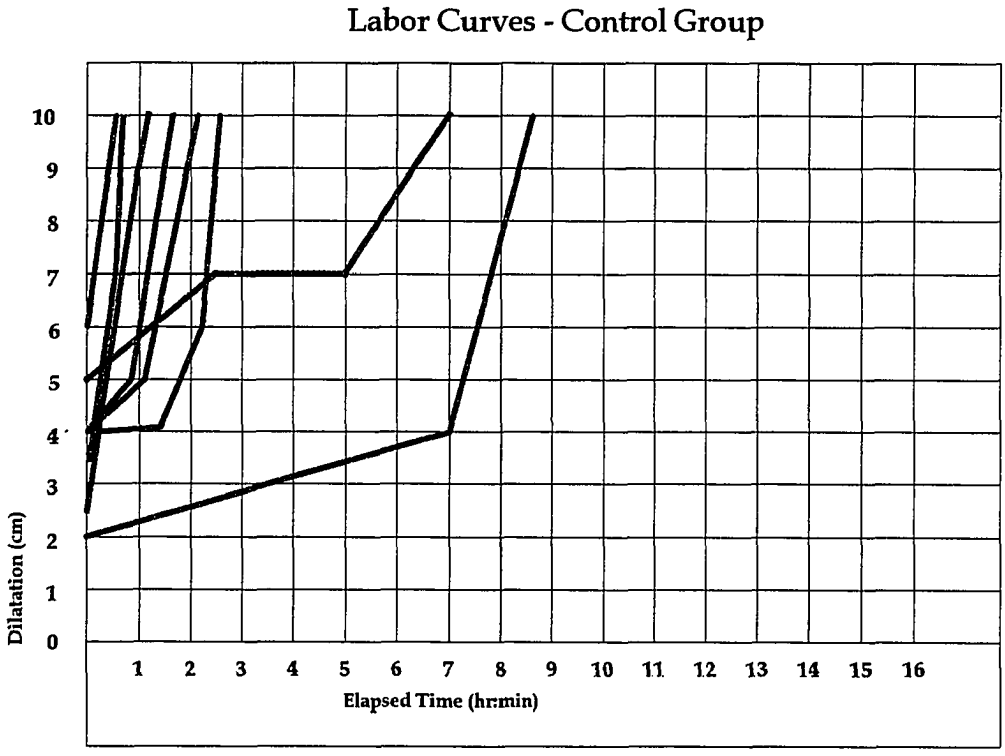

Figure 12. Composite of labor curves of the control group expressed in hours.

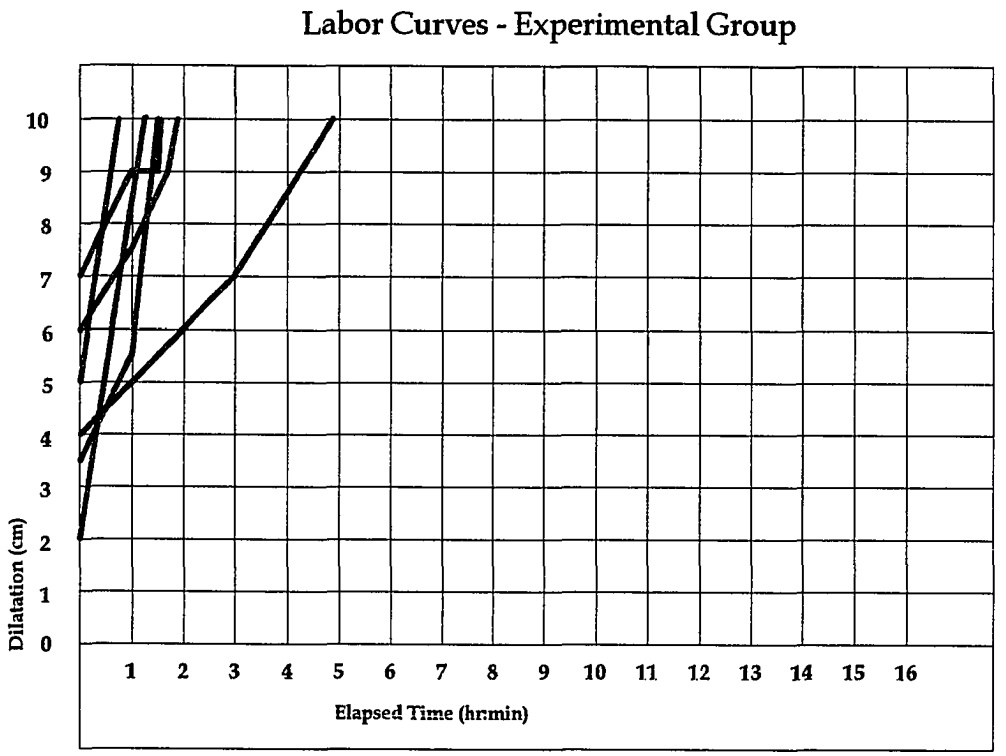

Figure 13. Composite of labor curves of the experimental group expressed in hours.

Results

The null hypothesis was not rejected. There was no statistical difference in duration of labor from 7 to 10 cm dilatation for either the experimental or the control group mothers (see Table 60). The median test, T, is equal to zero for these two samples. Thus, there was no significant difference between populations. As is evident from the figures most labors in both groups were of swift progression. The two farthest outliers, one in each group, represented mothers who had been given epidural anesthesia. One mother in the control group experienced a 2.5 hour delay at 7cm. This was considered an abnormality. Individual labor graphs are found in Appendixes G and H.

Discussion

The median test requires np and $n(1 - p) > 5$ where n = sample size and p = the population proportion (Daniel, 1990). This is not met with this sample size. Time in labor from 7 to 10 cm is equal. The graphic representation of the two groups' total labor, disregarding the two outliers, does appear to be quicker for the experimental group. It is consistent with clinical reality that by seven cm dilatation, labor is firmly established in the multipara. Delay at this point is unusual and a cause for concern. For that reason, the entire hospital course of labor was evaluated (see Figures 12 & 13 for a graphical representation of the mother's cervical dilatation at admission). This is arbitrary in that the mother's choice of a time to present herself to the hospital for

Table 60

Minutes in labor from 7-10 cms dilation

	Control Group	Imagery Group
Minimum	7.5	20
Maximum	270	108
Median	28	49
n	8	6

admission is variable and possibly due to many non-obstetric causes. Nevertheless, given the data available, analysis of total admitted time in labor provides an observation of progress in labor (see Figure 14). The Control group mothers had a much longer time in labor from admission to delivery. Statistical analysis of these times shows greater means, standard deviations, and medians for the Control group (see Table 61). It is evident that the assessment of the last three centimeters of dilation did not furnish an adequate picture of the efficacy of imagery in this small sample. Inclusion of a larger group might answer questions about whether the Experimental group mothers were admitted at greater cervical dilatation and confirm whether total time in labor is reduced with the use of imagery.

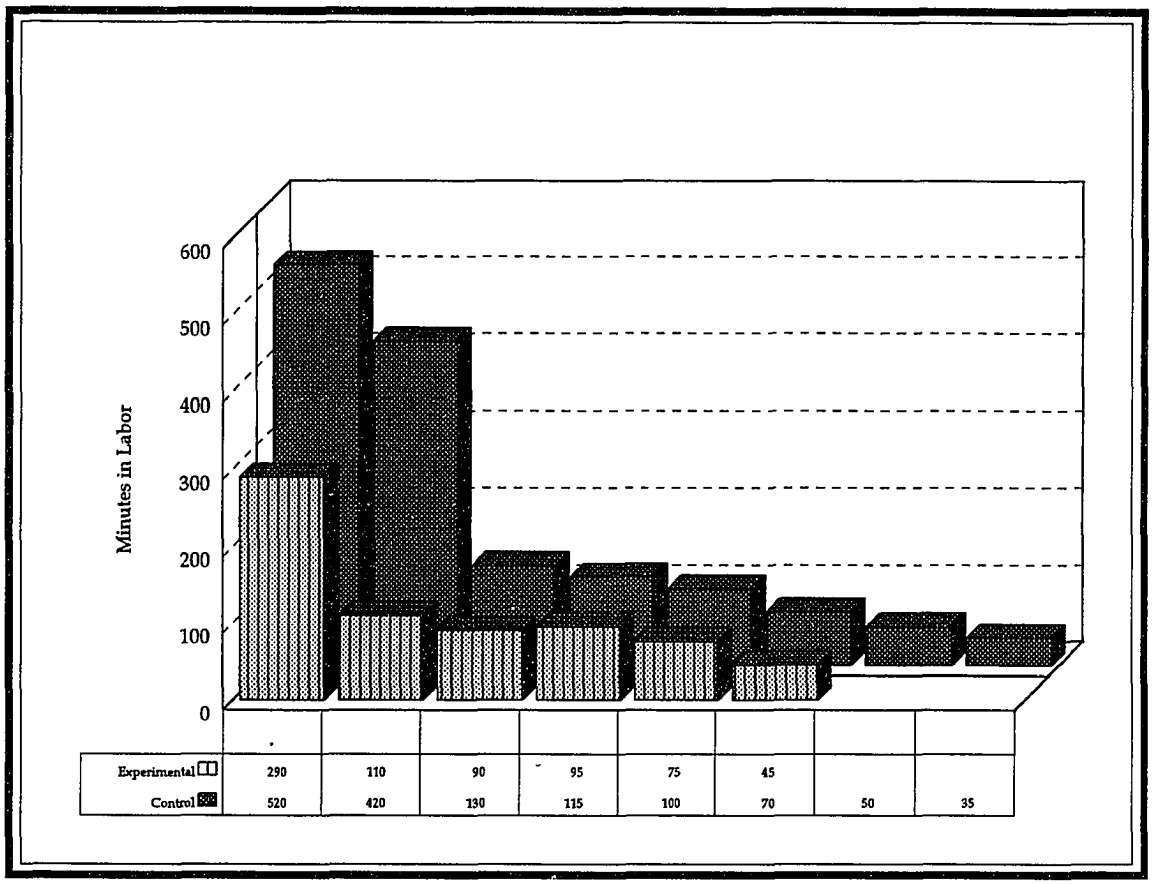

Figure 14. Comparison of total minutes of labor from admission to complete dilatation.

Table 61

Total Minutes in Labor from Admission through Complete Dilatation

	Control Group	Imagery Group
Minimum	35	45
Maximum	520	290
Median	107.5	92.5
n	8	6

Maternal Vital Signs

In the presence of imagery, relaxation results in a hypometabolic state. As Benson (1975) described it, pulse and respiratory rate slow. Blood pressure decreases in a hypometabolic state, while the person remains alert and open to imagery. The blood pressure and pulse of mothers using imagery might be expected to be lower than those in the control group, due to relaxation or absence of anxiety.

Purpose

The purpose of this portion of the study is to determine if the experimental mothers experienced a more relaxed or hypometabolic state as evidenced by lower blood pressure and pulse rates at admission, when compared to the control group mothers.

Hypotheses

Ho-2: There is no difference in blood pressure (Mean Arterial Pressure), or pulse, at admission in mothers who used active imagery as compared to those mothers who did not.

Ha-2: There is a difference (less) in blood pressure (Mean Arterial Pressure), or pulse, at admission in mothers who used active imagery as compared to those mothers who did not.

Method

Subjects The subjects tested were the six mothers who used active imagery in labor (experimental) compared to eight mothers who did not (control).

Design. Blood pressure expressed as Mean Arterial Pressure (MAP), pulse, and dilatation at the time of admission for each of the mothers in both groups were compared by means of one way analyses of variance using Excel Version 4.0 statistical software (Microsoft, 1992).

Procedure. Admission blood pressure was used and converted to Mean Arterial Pressure (MAP) using the following formula:

$$MAP = [(2 \times diastolic) + Systolic]/3.$$

MAP was compared between groups as was pulse at admission. In addition, degree of dilatation at admission was analyzed.

Results

There was no significant difference in blood pressure at admission for either of the two groups of mothers (see Table 62). Table 63 shows that pulse rate differed significantly between the two groups. Table 64 of means and standard deviations reveals that pulse was higher in the imagery group. In an

Table 62

Comparison of Mean Arterial Blood Pressure in Experimental and Control Groups

Source	SS	DF	MS	F	P
Between Groups	5.54	1	5.54	.064	.80
Within Groups	1040.64	12	86.72		
TOTAL	1046.17	13			

Table 63

Comparison of Admission Pulse Rates in Experimental and Control Groups

Source	SS	DF	MS	F	P
Between Groups	390.10	1	390.10	6.13	.03
Within Groups	763.34	12	63.61		
TOTAL	1153.42	13			

Table 64

Descriptive Statistics for Mean Arterial Blood Pressure and Pulse at Admission

MAP	M	SD	n
Control	85.69	10.90	8
Experimental	84.42	6.45	8
Pulse			
Control	76.00	7.84	8
Experimental	86.67	8.16	8

effort to explain these findings, the amount of cervical dilatation at that same point was analyzed (see Table 65). The cervical dilatation did not differ statistically between the two groups, although the group mean for the imagery group was higher (Table 66). The fact that the imagery group mean was 4.58 cm (compared to the control group's mean of 3.62 cm), well into active labor, may account for the higher pulse rate in this group. The effort at the advanced stage would be expected to be more intense.

Discussion

Blood pressure is an ephemeral value, subject to moment to moment variation, errors in technique, and changes with exercise (such as labor). This study was further plagued by variation in the times and frequency that the blood pressure was measured during each mother's labor experience at the two hospitals. Progression in labor for one of the mothers was so quick that interim vital signs were not taken. Ideally, blood pressure and pulse should have been taken at a set interval for all mothers. However, in using the clinical setting and health care providers who are not part of the research effort, vital sign determination was not in the control of the researcher. In addition, the level of documentation was not uniform. One mother might have vital signs taken at hourly intervals as hospital protocol required and another might have only admission vital signs. For this reason, the researcher's original plan to use vital signs throughout the labor period to describe the total level of effort was not possible. All mothers had one consistent measurement taken, admission vital signs. This was used as a means of comparison.

Table 65

Comparison of Cervical Dilatation at Admission

Source	SS	DF	MS	F	P
Between Groups	3.15	1	3.15	1.42	.26
Within Groups	26.58	12	2.22		
TOTAL	29.73	13			

Table 66

Descriptive Statistics for Cervical Dilatation at Admission

	M	SD	n
Control	3.62	1.22	8
Experimental	4.58	1.80	8

It was a concern that admission pulse and blood pressure might not describe the difference between groups. However, the experimental group parents had been practicing imagery and relaxation for weeks before the labor started. This mental rehearsal was hypothesized to cause a general reduction in stress and a practice effect which decreased anxiety. Therefore, vital signs could differ. However, the predicted differences were not found. The more advanced stage of labor in the Experimental group at the time of vital sign measurement, possibly resulted in their higher pulse rate. Tighter controls during the laboring period in the participating hospital during replication of this study, together with a larger sample size, could determine if the Imagery group consistently had elevated pulse rates and if this was coincident with greater dilatation and further progress in labor.

Pain

The third research question asked, "What is the relationship between coping strategies and the experience of pain in labor and delivery?" Imagery has been accepted as a mechanism of pain control. In labor, pain increases anxiety and muscle tension and retards labor. Pain also inhibits the ability to participate in the bonding process with the infant and colors the perception of the entire birth experience. Couples were free to use any method of pain control during labor. Three of the mothers received epidural anesthesia (two in the imagery group, one in the control group). While a successful epidural eliminates any sensation of pain, it also retards labor and frequently hampers the expulsive

urge to deliver. See labor curves 1, 3 and 5 in Appendixes G and H. All three curves are prolonged with respect to the other subjects in their group.

Purpose

The purpose of this portion of the study was to determine if mothers who used active imagery required less medication than mothers in the control group.

Hypotheses

Ho-3: There is no difference in medication usage in mothers who used active imagery in labor as compared to those mothers who did not.

Ha-3: There is a difference in medication usage in mothers who used active imagery in labor as compared to those mothers who did not.

Method

Subjects. The subjects tested were the six mothers who used active imagery in labor (experimental) compared to eight mothers who did not (control).

Design. A simple count of the number of times medication was used for each individual was tabulated. Simple percentages were computed.

Procedure. Conversion of the drugs into morphine equivalents (McCaffery, 1986) allowed comparison of simple percentages between the two groups.

Results

Table 67 shows the mechanism of pain control. Local and pudendal anesthesia involve local infiltration of an anesthetic agent into maternal tissues for crowning of the head or episiotomy during delivery. No medication was used for the labor process. For labor, those using systemic medications (Demerol and Nubain, both synthetic narcotics, and Phenergan, an anti-emetic and narcotic antagonist) comprised 25.00% of the imagery group and 42.85% of the control group. (This proportion does not take into account the three mothers who used epidural analgesia.) In this sample, less medication was required by the Experimental group.

Discussion

Mothers were not restricted in their choice of pain control instruments during labor and delivery. It was predicted that the use of imagery would decrease the need for medication so that the Experimental group would use less medication. Table 67 depicts that proportionally fewer mothers in the imagery group required medication. This is noteworthy in the face of an extremely aggressive anesthesia training program at one of the hospitals. All mothers were offered epidural analgesia at that institution after they were in active labor at 5 cm dilatation.

It is desirable to achieve comfort and effective work during labor because oxygen requirements are decreased for the mother and optimized for the child. The American Academy of Pediatrics (1978), in a position paper, advocate the

Table 67

Mechanisms of Pain Control

Group	Medication	Morphine equivalency
1-Imagery	Epidural	N/A
2-Imagery	Demerol/Phenergan	6.7 mg
3-Imagery	Epidural	N/A
12-Imagery	local	0
13-Imagery	none	0
14-Imagery	none	0
4-Control	Demerol/Phenergan	6.7 mg
5-Control	Epidural	N/A
6-Control	Pudental/local	0
7-Control	Nubain	10 mg
8-Control	Demerol	3.35 mg
9-Control	none	0
10-Control	local	0
11-Control	local	0

avoidance of the use of drugs which can affect the baby whenever possible. They counsel that the minimum effective dose of drugs for maternal pain relief should be used. Sedative effects with possible respiratory depression are experienced by the child when narcotics are passed through placental circulation. Furthermore, an alert, comfortable mother can better control her responses to contractions. The imagery group was more able to control labor pain and foster the progress of labor without the need for systemic medication. This also has implications for better long term infant health (American Academy of Pediatrics, 1978).

Apgar Score

Although the child is a separate individual, its well-being is the product and endpoint of labor and delivery. For this reason, determination of the Apgar scores are a logical indicator of the success of labor. Molfese et al. (1987) used Apgar scores as outcome measures in a multivariate study of the implications of anxiety, depression, and stress on pregnancy outcome. High Apgar scores demonstrate the efficacy of the baby's physiologic function and are intimately dependent upon the mother's psychologic and physiologic functioning during labor.

Purpose

The purpose of this investigation was to discern if the Apgar scores of babies whose mothers used active imagery were higher than those whose mothers did not.

Hypotheses

Ho-4: There is no difference in one minute or five minute Apgar scores for babies whose mothers used active imagery in labor compared with those whose mothers did not.

Ha-4: There is a difference in one minute or five minute Apgar scores for babies whose mothers used active imagery in labor compared with those whose mothers did not.

Method

Subjects. Subjects were the 14 babies (8 control and 6 experimental group) born to the couples entered into the study.

Design. One minute and five minute Apgar scores were analyzed by t-tests for independent means. T-tests were computed with Excel Version 4.0 (Microsoft, 1992).

Procedure. Data were obtained from the maternal inpatient charts and analyzed.

Results

The experimental group had higher Apgar scores at one minute (Table 68) and higher scores at five minutes (Table 69). Neither of these findings were statistically significant, although the one minute Apgar almost reached the level of $p < 0.05$. One "low" Apgar (7/8, a score of 7 at one minute, 8 at five minutes), occurred in the child whose mother had been medicated with Nubain, a synthetic narcotic known to depress respiration.

Table 68

Comparison of One Minute Apgar Scores Between Groups

One Minute Apgar	Control	Imagery	
Minimum	7	8	
Maximum	9	9	
Mean	8.13	8.67	
Standard Deviation	0.52	0.64	
n	8	6	
			t-test = 1.75
			df = 12

p = 0.05

Table 69

Comparison of Five Minute Apgar Scores Between Groups

Five Minute Apgar	Control	Imagery
Minimum	8	9
Maximum	9	10
Mean	8.87	9.17
Standard Deviation	0.41	0.35
n	8	6
		t-test = 1.40
		df = 12

p = 0.10

Discussion

The assignation of scores for reactivity to extrauterine life is fairly arbitrary and has been known to have political implications. "Scores are often inflated secondary to provider inexperience, ego, or fear of criticism by management" (Josten, Johnson, & Nelson, 1987, p. 844). Some practitioners look on less than optimal Apgar scores as a criticism of their practice and assign high scores accordingly. For years, Apgar scores have been the only evaluative method available to rapidly rate the child at birth. In these samples, scores remain in the high end of the scale despite listed complications ranging from nuchal cord, and light meconium staining of the amniotic fluid, to decelerations of heart rate on fetal monitor, all indications of fetal distress. Although the Apgar score may vary with the examiner and fetal effects, iatrogenic and otherwise, it is the standard of practice and was applied to all children. At an alpha level of 0.05, the one minute Apgar scores for the Imagery group were very close to being significantly different from the control group. Imagery group babies had higher Apgar scores and by implication were healthier. Scores of the experimental group at five minutes did not differ statistically from the control group.

Far more scientific and unbiased measurements, such as umbilical cord blood gases, exist to assess neonatal well-being. Many researchers have sought to establish the relationship between the Apgar scores and the umbilical cord blood gases (Josten, et al., 1987; Silverman, Suidan, Wasserman, Antoine, & Young, 1985; Sykes, et al., 1982).

Blood Gases

The determination of the blood gases: partial pressure of oxygen, partial pressure of carbon dioxide, and pH in the umbilical artery and vein represent a more accurate measure of neonatal health than Apgar scores. Petrie (1991) provides normal values and states that the reliability of cord gases is well established in identifying correlations between outcome and well-being. He further contends that blood gas values are most useful in view of their correspondence to fetal heart monitoring. Posiero et al., (1979) report blood gas values to indicate the success of their upright laboring posture.

Purpose

The purpose of this section was to determine if umbilical cord blood gases differed between neonates of mothers who used imagery and those who did not.

Hypotheses

Ho-5: There is no difference in umbilical cord blood gases for babies whose mothers used active imagery in labor compared with those who mothers did not.

Ha-5: There is a difference in umbilical cord blood gases for babies whose mothers used active imagery in labor compared with those who mothers did not.

Method

Subjects. Subjects were seven of the children who had blood gas values drawn according to the hospital protocol for all births. There were three Control group babies and four Experimental group babies. The mothers of the Control group babies had used: Demerol/Phenergan, epidural, and pudental/local anesthesia for the birth, respectively. The Experimental group mothers had used: epidural, Demerol/Phenergan, local anesthesia for the birth, and nothing, respectively.

Design. Umbilical cord blood gas values at birth, which represent uterine oxygen carbon dioxide exchange, were analyzed by t-tests for independent means using SYSTAT statistical software (Wilkinson, 1990). The alpha level for all tests was 0.05.

Procedure. Data were obtained from the maternal inpatient charts and analyzed.

Results

As seen in Table 70, arterial pO_2 concentrations were significantly higher in the imagery group. Venous pO_2 was also higher in the imagery group babies, although not significant. Arterial pCO_2 levels were higher in the Control group, also not significantly. There was no significant difference in pH determination.

Table 70

Comparison of Cord Blood Gas Analysis

Variable	Control[a]	Imagery[b]		
pH arterial	M = 7.22	M = 7.36	t = 1.99	df = 5
	SD = 0.14	SD = 0.03	p = 0.10	
pH venous	M = 7.32	M = 7.40	t = 1.26	df = 5
	SD = 0.12	SD = 0.04	p = 0.26	
pO_2 arterial	M = 6.17	M = 22.37	t = 3.38	df = 5
	SD = 2.60	SD = 7.81	p = 0.02	
pO_2 venous	M = 20.10	M = 30.65	t = 2.28	df = 5
	SD = 4.37	SD = 6.94	p = 0.07	
pCO_2 arterial	M = 57.73	M = 39.37	t = 2.46	df = 5
	SD = 14.19	SD = 4.91	p = 0.06	
pCO_2 venous	M = 40.17	M = 33.97	t = 1.27	df = 5
	SD = 8.14	SD = 4.83	p = 0.25	

Note: Normal values arterial pH = 7.28 ± 0.15, venous pH = 7.34 ± 0.15, arterial pO_2 = 15 ± 10, venous pO_2 = 30 ±10, arterial pCO_2 = 45 ± 10, venous pCO_2 = 35 ± 8 (Petrie, 1991, p. 475).

[a] n = 3, [b] n= 4

Discussion

The level of pH is now used as the overall indicator of health in the neonate. There was no significant difference in pH between the two groups of babies indicating that all the children were healthy. In neonatal physiology, the artery carries blood which has already delivered its supply of oxygen to the baby, while venous blood contains a full amount of oxygenated blood from the mother to placental circulation. The greater level of oxygen in arterial circulation attests to better oxygenation of the imagery babies at birth since none of these children experienced conditions which jeopardized oxygen utilization such as maternal-fetal hemorrhage. The difference between venous and arterial levels indicate that they used an appropriate amount of oxygen. If the children had increased carbon dioxide concentration, it would result in fetal acidosis and a drop in pH with compromise of the child.

The mean level of arterial CO_2 in the control group was above the range of normal and much higher than the imagery group, but not significantly so. This is the level of carbon dioxide returning from the baby to the maternal circulation. The better oxygenation and lower carbon dioxide levels indicated better functioning of the mother-baby unit. Since all children were healthy these more efficient oxygenation parameters can be directly attributed to the mother's labor and the intervention of imagery. Higher levels of O_2 extraction and CO_2 production in the Control babies represents increased work and thus stress on the part of the baby.

Sykes et al. (1982) found that Apgar did not reflect the amount of acidosis at delivery (pH level), while Silverman et al. (1985) found that Apgar was related

to umbilical cord blood gases only when there was great derangement in the values. Neither Apgar scores or blood gas determinations were predictive of long term neurological problems. Josten et al. (1987) expanded the information, echoing the viewpoint that even blood gases are poorly predictive of asphyxia and long term problems. They state that pH determinations are useful with severe metabolic acidosis, but not indicated for day to day use in a population of healthy neonates.

Since all children in this study were healthy, long term prediction of neurological deficits was not needed. Results of Apgar scores and blood gas determinations were consistent. Imagery group babies had higher values in the whole group of well babies. This was perhaps due to their mothers' use of active imagery.

It is ironic that the expensive, high technology assessment of neonatal health performed as well as the traditional assessment in this holistically oriented study.

Summary

This investigation found that the duration of labor from 7 to 10 cm dilatation did not differ between mothers using active imagery during labor and delivery and those mothers who did not. However, total time in labor in the hospital setting was decreased in the imagery group. Assessment of maternal vital signs showed no difference in blood pressure and an increase in pulse rate in the imagery group, perhaps attributable to a more advanced stage of labor. The mothers who used imagery for pain control required less medication. Their

children had higher one minute Apgar scores, higher levels of arterial pO_2, and lower levels of arterial CO_2. These indicators were supportive of the premise that active imagery could improve the outcome, the process of labor and delivery by aiding in pain control and optimizing the baby's health.

Discussion

This investigation was conducted to determine the impact of the use of active imagery during labor and delivery as a method of pain control and to facilitate the physiological processes of labor. The increasing sophistication of obstetric technology has surpassed the development and validation of holistic labor management (Geden et al., 1984). Active imagery has been successful in other healthcare agendas (Achterberg & Lawlis, 1978, 1980; Pelletier, 1977; Sachs, Feuerstein & Vitale, 1977; Simonton, Simonton, & Creighton, 1978). Its use in labor and delivery had the advantage of being non-invasive and inexpensive.

The dual investigation into imagery's impact on both the physiological and the psychological was an effort to reestablish the totality of viewpoint. It is useful in today's dichotomized healthcare arena to try to view the individual as a unit. This study attempted to add to the totality of work which cares for body with the mind, and the mind with the body. The impact on the parents using imagery was subtly evident. Procedural problems aside, differences in subjective and objective measures of self worth and control were found. Physiologically, the use of medication was reduced in labor which, in itself, was important and may have been the mechanism of the improved neonatal assessment in the experimental group.

This study provided the first test of imagery in clinical obstetrics. Analog labor studies (Beck & Siegel, 1980; Geden et al., 1984; Geden et al., 1989; Stevens & Heide, 1977; Stone et al., 1977) lacked the full impact of the holistic

interaction in labor. For these same reasons, this study was unwieldy. To properly assess both body and mind in pregnancy, labor, and delivery requires a full staff of researchers. This is particularly true if the large cohort that this study requires is to be assessed. However, a start has been made.

As Schneider and Eichmann (1988) found, few researchers are studying pregnancy, especially the father. This study found that there were no differences in anxiety responses as measured on the STAI between the genders. Both mothers and fathers were primarily Internally controlled on the locus of control studies. Men had greater feelings of Internal control and women had greater feelings of control by Powerful Others. This agrees with Schneider and Eichmann's findings but disagrees with numerous prior studies which found no gender differences in locus of control. There were no differences detected on prenatal responses to the ACL before delivery. The experientially based ACL scales were equivalent to other normal populations (Gough & Heilbrun, 1965). Therefore, this provided a beginning look at both men and women during late pregnancy.

The psychological impact of the use of active imagery agreed with the hypothesis. Although no change was evident in anxiety levels, the locus of control of the imagery participants remained internal and was protected from a steep increase in control by Chance. Self assessed personality factors indicated that the imagery group was stronger, more confident, and less dependent after the birth using imagery. In effect, imagery worked for these parents. They felt good about the experience.

The hypothesis that the use of imagery would impact the physiological progress of labor was supported. Time in labor from admission to complete

dilatation for the six mothers practicing active imagery appeared shorter than the labors experienced by the eight mothers in the control group. Decreased vital signs, representative of a calmer state in the labor period, for the imagery group mothers were not found. Subjectively, mothers were pleased with the use of imagery and used it in other applications. Three imagery group mothers were assessed for the vividness of their imagery process. All reported moderately clear vividness of imagery.

Istvan (1986) studied prior research into the implications that stress has on birth outcomes. In many animal models, anxiety has direct effects on health or litter size. Folk wisdom has tried to link anxiety to altered human birth outcomes. Biobehavioral responses to anxiety such as smoking, poor eating habits, excessive weight gain, and alcohol ingestion have direct effects on fetal health. The etiology of the stressor and its place in the chain of events are difficult to tease out. Direct impact of the anxious state on the unborn child is simplistic. Lack of prenatal care has often been correlated with education and socioeconomic status as has stress itself (Rofe, Blittner, & Lewin, 1993). In this extremely complicated web of pregnancy outcomes and potential stress agents, self reported assessments have been used to measure outcome. As this study has found, these reports are open to error and difficult to quantify. Assessment of maternal endorphin levels to determine pain control, urinary catecholamine or corticosteroid levels to assess stress would provide objective data.

This study was a first attempt with primitive tools to assess the impact of active imagery on labor and delivery. Cleaner, more precise measures have been developed in the years since this study was formulated. The study was worthwhile because it began to fill a void in the knowledge of mind-body

interaction and the individual mother's ability to control her health. It has proved an excellent learning platform for the investigator both on what should and should not be done in research. Most importantly, it improved the lives and health of a small group of expectant parents and their children by their own report.

Extreme caution must be used when interpreting the findings of this study. Although, the results are encouraging the sample size cannot support generalization beyond this group. Follow-up with greatly increased sample size is warranted to explore the tentative results suggested here.

Implications

The implications for the provision of care are several. Imagery has sufficient anecdotal and scientific support to warrant its use. Informal or organized programs of imagery for control of pain are useful and becoming more accepted. Current public awareness of alternative medicine is burgeoning (Eisenberg et al., 1993). This study provides an assessment of a labor management strategy which has potential to improve the health of the child and the parents. Institution of imagery as an augmentation to prenatal education has possible implications for bonding relationships and the prevention of abuse and neglect. The theoretical basis of systems theory and the holism of the human organism was borne out by the impact of a mental operation on both the physical and psychological.

The demography and self-selection of the sample for this study limit its generalization. This was an educated, aware group with ready access to health

care. Imagery, as a readily available intervention should be studied with less educated, more at-risk groups. As Finke (1985), Johnson (1982), Kosslyn and Koenig (1992), and Sheehan (1966b) describe, imagery is functionally similar to perception. This would seem to open the imagery strategy to all levels of intelligence and education.

Small sample size and poor questionnaire return occurred in this study. The processes and results of sample recruitment were significant. Over 2,500 medical records were reviewed for inclusion criteria. Of the approximately 250 patient records fitting the criteria, 16 couples participated. In the southern portion of the United States, processes such as imagery and the self-hypnosis which it represents were felt to be contrary to fundamentalist religious practices. Difficulty in recruitment was directly related to mistrust of the imagery process.

At presentation before Institutional Review Boards, the investigator was told by physicians that the study could be run but that no one would volunteer. As Geden et al. (1984) stated "A number of factors make it difficult, if not impossible to investigate these issues" (imagery etc.) "within a clinical childbirth context" (p. 261). Given the climate, sparsity of population is explained. However, larger sample size is required to fully explore the role of imagery in labor and delivery.

A large institution with a significant client population who are committed to wellness, such as an HMO would be an ideal setting to replicate this study. Imagery has the simplicity and cost-effectiveness to be an asset in the care of an HMO's participant population.

Recommendations

The following recommendations were occasioned by this research.

1. Continued research in the perinatal period, free of gender bias, should be conducted to form a body of study that is not limited by stereotypical views of men, women, and childbearing.
2. Imagery has promise in obstetrics, and in all of health care. Repeated studies to validate findings, to explore the role of culture in the practice of imagery, and to apply it to new venues are indicated.
3. Better support of alternative interventions should be fostered in the medical community. With the concerns of the health care agenda, less intrusive, less costly, natural treatment should be encouraged.
4. Replication of this study of imagery in obstetrics should make use of scientific instrumentation, catecholamine sampling, endorphin sampling, fetal heart monitoring, and cord blood gas analysis.
5. Replication of a streamlined form of this study is recommended. Obviously, a larger sample is required. Research under the aegis of a respected organization or in a more open cultural milieu would take the issue out of the religious arena and allow a good cross-sectional sample.
6. Replication of this or other imagery studies in the Hispanic community to access the vivid indigenous imagery present in this culture would add to psychological knowledge about the process.

7. The study of imagery in a culture which uses ideographic linguistics, such as the Chinese or Japanese, would explore issues of imagery coding and physiologic substrate.

8. The ease of physiologic measurement and its results even in this small sample should not dissuade the researcher from qualitative investigation into this area, an analysis which probably more fully depicts the relevant response of the individual.

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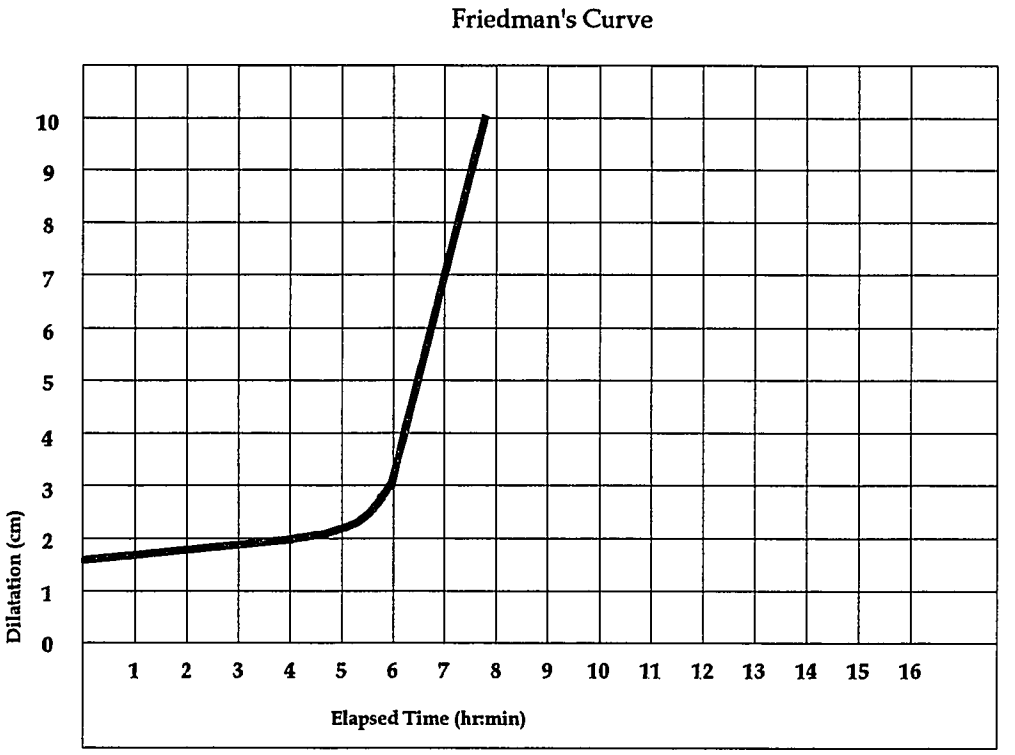
Appendix A

Friedman's Curve



(Friedman, 1970, p. 82)

Appendix B

Consent Form

* A study to discover the progress of psychological feelings during pregnancy and afterwards.

* Evaluation of the use of relaxation and imagery in labor and delivery.

The following is information about the study. If you have any questions or anything is unclear, your questions will be answered.

Purposes - One purpose of this investigation is to study how both mother and father's feelings develop throughout pregnancy. The other purpose is to see how the use of active imagery, affects labor and delivery in addition to any other techniques or treatments you might use. Active imagery is the use of the mind and the images that it sees, hears, tastes, smells or feels to actually change the body's responses.

Procedures to be followed - Your participation in the study does not affect your medical care. At your visit at 26 weeks, at 39 weeks and at your postpartum visit you will be asked to take some psychological tests. Your husband will receive similar tests. They take some time to fill out, so you may take them home and drop them in the mail in the attached envelope when you are finished.

If you are part of the group who will use the imagery technique in labor, you will be taught how to use it by means of presentations and an audio tape which becomes yours. You will be asked to practice imagery frequently and to keep a log of your practice times. One ten minute questionnaire will be requested after you become comfortable with the technique. The Labor and

Delivery nurses will be aware that you are using imagery and will support your use of it.

If you join the study and perform the psychological testing you will then be assigned randomly to the imagery or non-imagery group.

In either case numbers from your Labor Record will be used for statistics with no identifiable connection to you.

The risks of the study - There are no risks associated with the psychological testing. In the Active imagery section, the use of the mind is very powerful. Some people may find imagery disturbing, if you do, you will not be asked to continue use of this technique. One risk of the study could be that the imagery could mistakenly direct the body if proper knowledge of anatomy and physiology are not used. To keep this from happening your doctor, nurse, childbirth educator and this investigator will teach you the proper anatomy and physiology.

Benefits of the study - First, the study will provide new information about how expectant couples feel during the childbearing experience. Second, if the imagery works for you, you will have gained an effective new technique to help you control your health and be involved in your baby's birth.

No compensation, monetary or otherwise is available for any injury occurring during this study.

This study does not offer comprehensive mental health care, if you should require this it is your responsibility to seek this in the community. The record of

your participation will be kept in strict confidence. It will not be possible for anyone reading the study to identify you.

I have read this consent form. I agree to participate. I agree to allow the investigators to obtain information from my medical record. I understand that I may withdraw this consent and discontinue participation at any time and this would not effect the care that I am given.

_____

Signature of Volunteer Date

_____

Signature of Husband/Significant Other Date

_____

Witness Date

Appendix C

Consent Form - Brooke Army Medical Center

VOLUNTEER AGREEMENT AFFIDAVIT

For use of this form, see AR 40-3B; the proponent agency is the Office of the Surgeon General

THIS FORM IS AFFECTED BY THE PRIVACY ACT OF 1974

1. AUTHORITY: 10 USC 3012, 44 USC 3101 and 10 USC 1071-1087.

2. PRINCIPAL PURPOSE: To document voluntary participation in the Clinical Investigation and Research Program. SSN and home address will be used for identification and locating purposes.

3. ROUTINE USES: The SSN and home address will be used for identification and locating purposes. Information derived from the study will be used to document the study; implementation of medical programs; teaching; adjudication of claims; and for the mandatory reporting of medical condition as required by law. Information may be furnished to Federal, State and local agencies.

4. MANDATORY OR VOLUNTARY DISCLOSURE: The furnishing of SSN and home address is mandatory and necessary to provide identification and to contact you if future information indicates that your health may be adversely affected. Failure to provide the information may preclude your voluntary participation in this investigational study.

PART A - VOLUNTEER AFFIDAVIT

VOLUNTEER SUBJECTS IN APPROVED DEPARTMENT OF THE ARMY RESEARCH STUDIES

Volunteers under the provisions of AR 70-25 are authorized all necessary medical care for injury or disease which is the proximate result of their participation in such studies.

I, _____ SSN _____ having
(last, first, middle)

full capacity to consent and having attained my _____ birthday, do hereby volunteer to participate in
a study of the Impact of the Use of Active Imagery on Labor
and Delivery
(research study)

under direction of Nursing Service conducted at Brooke Army Medical Center (BAMC)
(name of institution)

The implications of my voluntary participation; the nature, duration and purpose of the research study; the methods and means by which it is to be conducted; and the inconveniences and hazards that may reasonably be expected have been explained to me by
Penelope H. Ward or her representative

I have been given an opportunity to ask questions concerning this investigational study. Any such questions were answered to my full and complete satisfaction. Should any further questions arise concerning my rights on study-related injury I may contact
Center Judge Advocate
at BAMC, Ft. Sam Houston, Tx 78234-6200 or (512) 221-2206
(name and address of hospital & phone number (include area code))

I understand that I may at any time during the course of this study revoke my consent and withdraw from the study without further penalty or loss of benefits however, I may be ☐ required (military volunteer) or ☐ requested (civilian volunteer) to undergo certain examination if, in the opinion of the attending physician, such examinations are necessary for my health and well-being. My refusal to participate will involve no penalty or loss of benefits to which I am otherwise entitled.

PART B - TO BE COMPLETED BY INVESTIGATOR

INSTRUCTIONS FOR ELEMENTS OF INFORMED CONSENT: (Provide a detailed explanation in accordance with Appendix E, AR 40-3B or AR 70-25.)

NATURE OF THE STUDY: You and your spouse are being asked to take part in a study to see how the use of active imagery affects labor and delivery. In addition, the progress of psychological feelings during pregnancy and afterwards will be noted.

Studies seem to indicate that active imagery may be a useful tool in coping with the discomforts of labor and delivery. Active imagery is the use of the mind and the images that it sees, hears, tastes, smells or feels to actively change the body's responses.

(CONTINUE ON REVERSE)

DA FORM 5303-R, APR 84

PART II - TO BE COMPLETED BY INVESTIGATOR (cont'd)

PROCEDURE: At your OB visits at 26 weeks, 39 weeks and post-partum, you and your spouse will be asked to take some psychological tests. They take some time to fill out, so you may take them home and drop them in the mail in the attached stamped envelope when you are finished.

You will be assigned randomly to either an imagery group or a non-imagery group. If you are in the imagery group, you will be taught the use of imagery in class and given an audiotape to practice with. There will be two classes to attend and you will be asked to practice the imagery and keep track of your practice. This is necessary to guide you in the proper performance of imagery to safely direct your body. You will then be able to use it for labor and delivery. If you are in the non-imagery group and desire to learn this technique, you will be taught the use of imagery after your participation in the study.

BENEFIT: You will gain new information about how expectant couples feel during the childbirth experience. If you use imagery and it works for you, you will have gained an effective new technique to control your health and be involved in your baby's birth.

The record of your participation will be kept in strict confidence. It will not be possible for anyone reading the study to identify you.

If you find the imagery disturbing, you will not be asked to continue. You may at any time withdraw from the study, as you wish.

The principle investigator in this study is Penelope H. Ward who can be contacted at (512)-692-7274. The co-investigator in Maj Cheryl Vaiani, ANC who may be contacted at beeper 8508. If you have any questions about the ethical, legal or social aspects: the review of this study by BAMC Institutional Review Board (IRB); or questions which you would like to discuss with someone other than the investigators, you may contact the Clinical Investigation Protocol Coordinator. BAMC at (512) 221-4495, who will answer your questions or refer to an appropriate person.

****

I have read the above explanation an agree to participate in the investigational study described.
I am aware that data from my medical records will be used but that I will not be personally identified.

SIGNATURE OF VOLUNTEER	DATE SIGNED	SIGNATURE OF CLINICAL INVESTIGATOR OR DESIGNEE (As an advisor)
PERMANENT ADDRESS OF VOLUNTEER	TYPED OR PRINTED NAME AND SIGNATURE OF WITNESS	DATE SIGNED

Reverse of DA FORM 5303-R, Apr 94

Appendix D

Consent Form - Wilford Hall Medical Center

Informed Consent

1. I hereby volunteer to participate as a test subject in this experimental study. The purposes of the study are to see how the use of active imagery affects labor and delivery, and to look at the progress of psychological feelings from the 13th week of pregnancy and after delivery. Studies seem to indicate that active imagery may be a useful tool in coping with the discomforts of labor and delivery. Active imagery is the use of the mind and the images that it sees, hears, tastes, smells, or feels to actively change the body's responses.

2. As a participant, I understand that I and my spouse will be asked to take some psychological tests at the OB visits at 26 weeks, 39 weeks and post-partum. They take some time to fill out so we may take them home and drop them in the mail in the attached stamped envelope when we are finished.

3. I understand that as a participant I will be randomly assigned to one of two treatment plans (schedules). By randomization, I understand that I will have an equal chance of being assigned randomly to either an image group or a non-imagery group. If I am in the imagery group, I will be taught the use of imagery in class and given an audiotape to practice with. There will be two classes to attend and I will be asked to practice the imagery and keep track of my practice. This is necessary to guide me in the proper performance of imagery to safely direct my body. I will then be able to use it for labor and delivery. If I am in the non-imagery group and desire to learn this technique, I will be taught the use of imagery after my participation in the study.

4. If I find the imagery disturbing, I will not be asked to continue. I may at any time withdraw from the study, as I wish.

5. I will gain new information about how expectant couples feel during the childbirth experience. If I use imagery and it works for me, I will have gained an effective new technique to control my health an be involved in my baby's birth.

6. There will be approximately sixty couples taking part in this study at two different hospitals. The record of my participation will be kept in strict confidence. It will not be possible for anyone reading this study to identify me.

7. Records of my participation in this study may only be disclosed in accordance with federal law, including the Federal Privacy Act, 5 USC 522a, and its implementing regulations. DD Form 2005 contains the privacy act statement for the records. I understand that records of this study may be inspected by the U. S. Food and Drug Administration (FDA).

I understand that my entitlement to medical and dental care and/or compensation in the event of an injury is governed by federal laws and regulations, and if I have any questions about my rights or if I believe I have received a research-related injury, I may contact the Medical Center Patient Representative, CMSgt Arthy J. LeMaire, and/or the Principal Investigator, Penelope Ward.

I understand that any clinical or medical misadventure will immediately be brought to my attention or, if I am not competent at the time to understand the nature of the misadventure, such information will be brought to the attention of my guardian or next of kin.

The decision to participate in this study is completely voluntary on my part. No one has coerced or intimidated me into participating in this program. I am participating because I want to. Mrs. Ward has adequately answered any and all questions I have about this study, my participation, and the procedures involved. I understand that Mrs. Ward will be available to answer any questions concerning procedures throughout this study. I understand that if significant new findings develop during the course of this study which may relate to my decision to continue participation, I will be informed. I further understand that I may withdraw this consent at any time and discontinue further participation in this study without prejudice to my entitlements to care. Should I choose to withdraw, my condition will continue to be treated in accordance with acceptable standards of medical treatment. I also understand that the investigator of this study may terminate my participation in this study at any time if he/she feels this to be in my best interest.

A copy of this form has been given to me.

_____

(VOLUNTEERS' SIGNATURE AND SSAN) (DATE)

_____

(WITNESS) (DATE)
(Must witness all signatures above)

_____

(ADVISING PHYSICIAN'S SIGNATURE AND SSAN) (DATE)

Privacy Act of 1974 applies. DD Form 2005 filed in Clinical/Medical Records. Title of Study: Impact of the Use of Active Imagery on Labor and Delivery
SGO#: 89-203
Date of IRC Approval: 13 June 89

Appendix E

Imagery Script

Now I'd like you to deepen your level of relaxation ...as I count backwards from 5 you will feel progressively more relaxed...5... with a deep breath you will feel the tension flow from your scalp down your neck to your arms and fall from your hands, pooling on the floor...4...breathe deeply and feel your inner tenseness flow out on the wind of your breath...3... feel the warmth of relaxation spread from your chest as you breathe deeply and seep down to your waist, down your hips, to your legs and down to your feet...2...you are safe and warm and relaxed, you may feel light as if there is nothing pressing on you, or you may feel heavy as you sink into the chair, in any case you are free to feel relaxed...1...you are even more deeply relaxed but aware, scan your body and see how good and relaxed you are. As you take your next breath feel the oxygen in the air as light...feel the shining molecules of oxygen as they come in your nose and enter your lungs. Follow them, give yourself permission to look around...see the pink walls of the bronchi illuminated by the bright oxygen, follow it to the beautiful shiny bubbles of the air sacs in your lungs...follow the oxygen molecules as they course through your body bringing freshness and light everywhere...spend some time looking and feeling and hearing and smelling...now as * you follow one of the large blood vessels, you see the uterus, it is a strong, powerful looking muscle, follow the curve of the outside, see how shiny it is...touch it and feel the periodic waves of contraction that move through it even now...follow the blood vessel inside...see the baby...watch it, see it move slowly...see how it is cradled securely in the womb...see the placenta throbbing as it brings food and oxygen to the baby...now feel as the wave of contraction

massages the baby... feel the strength of the muscle...see the baby's head as it slips into the downward position...feel the contraction ease as though the ocean has ebbed...with your breathing continue to become more relaxed...now with the next contraction, as it builds like a wave, feel the oxygen from your breathing spread light through the womb and to your baby...feel the enormous strength of the womb as it pushes the baby downward...allow it...you are relaxed...the muscle is contracting in the calm pool of your relaxed body...now see your baby's head press on the cervix...watch the waves of contraction and rest ...then gradually but steadily you see the cervix opening from the pressure of the baby's head...like a flower unwinding...ever more now ...stretching, naturally...see the cervix open more and more...feel the freedom...see the baby begin to slide through the birth canal now...smoothly, naturally...as you add your pushing to the increasing strength of the womb...as you rest and the wave recedes a little bit see how far the baby has come down...again you feel the overwhelming power of the contraction and you take a deep breath as you push, push, push with the contraction and feel your baby being stroked and massaged ...then as you rest and your baby rests you relax even further...you breathe deeply drawing in oxygen ...then as the next contraction approaches building strength like a wave in off the ocean, coming in faster and faster you push open.. you feel the perineum stretch ...you feel your baby's head push and stretch the skin as it slides through...the contractions seem gone... but then one more controlled push and you hear your baby breathe, you feel the warmth of it on your skin... you see it looking at you ...you are aware of your womb contracting to deliver the entire placenta....but now the image is fading...the time is not now, it is in the future...your baby will come in its own time ...it is not ready yet...when you are

ready, become aware of your place in the present, with your baby still cradled in your womb...and when you are ready return to this time and this place feeling refreshed and happy.

* the father will be invited to look into the womb with the clearest of windows.

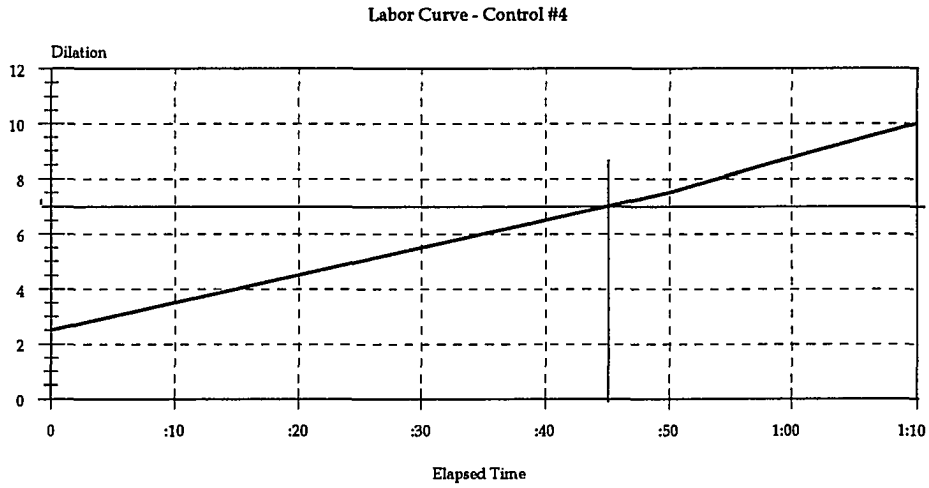
Appendix F

Physician's Consent

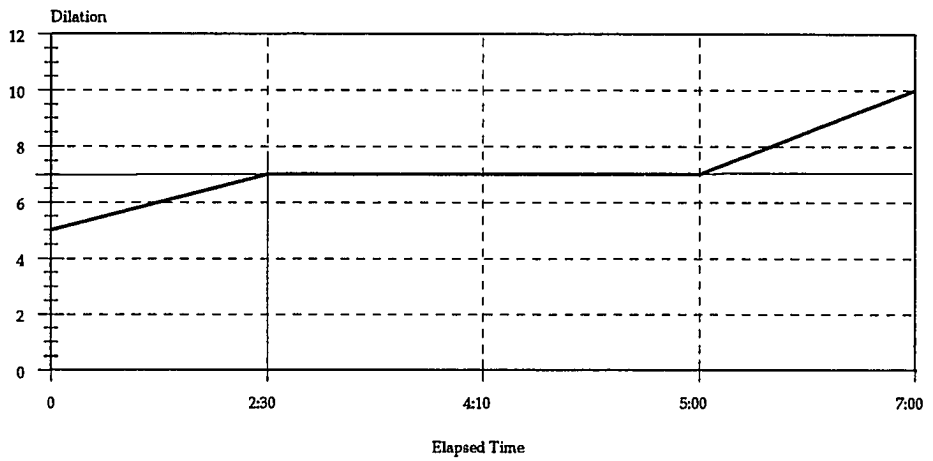
_____ has my permission to participate in the research study on the Use of Imagery in Labor and Delivery.

Appendix G

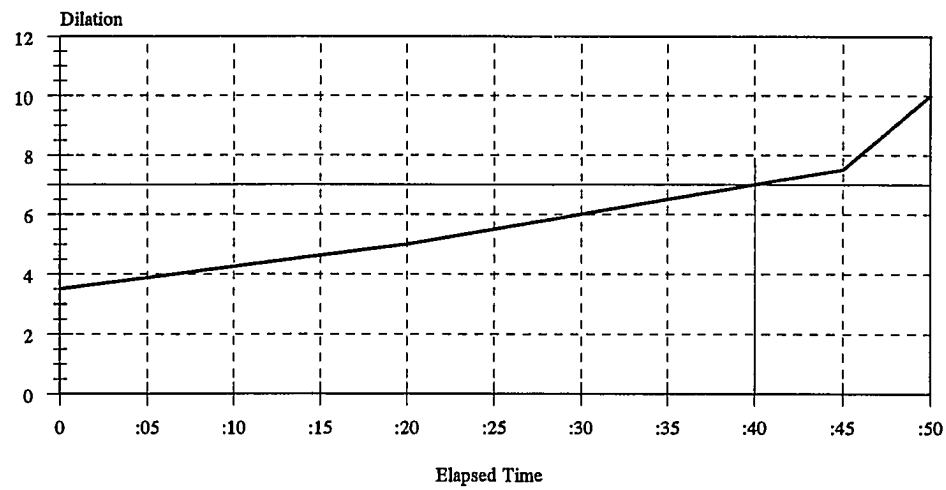
Control Group Time in Labor



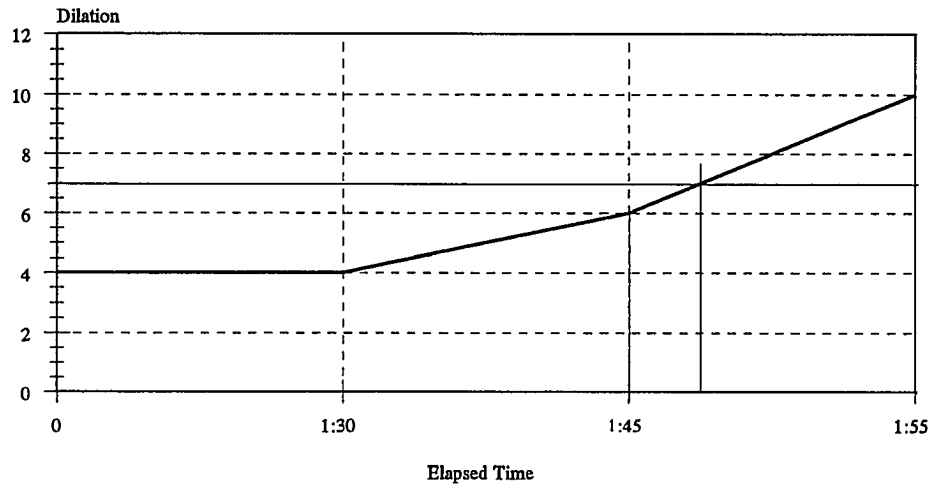
Labor Curve - Control #5



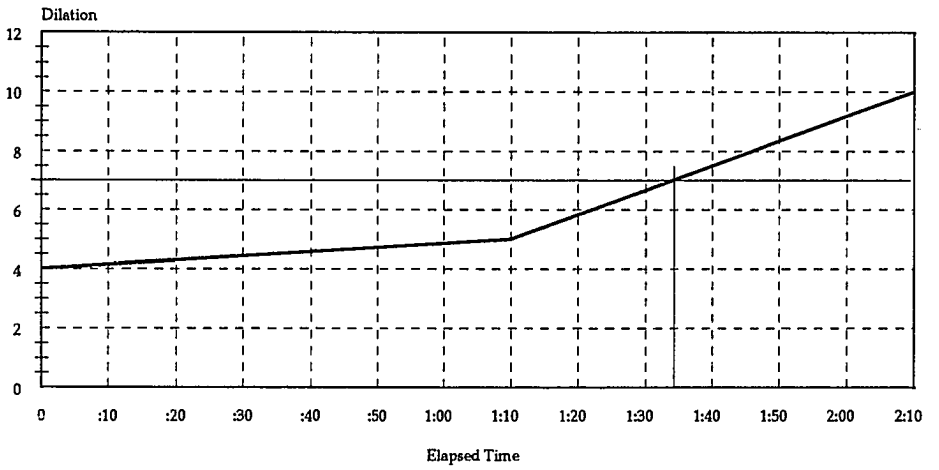
Labor Curve - Control #6



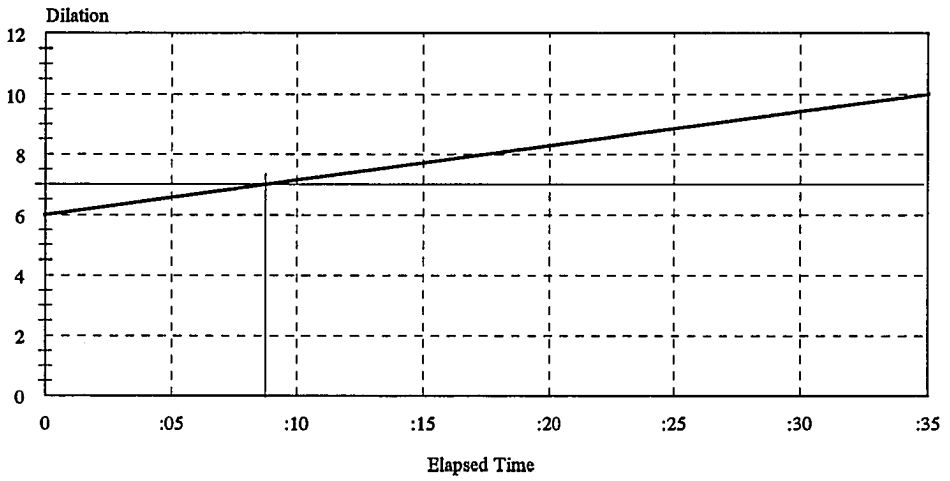
Labor Curve - Control #7

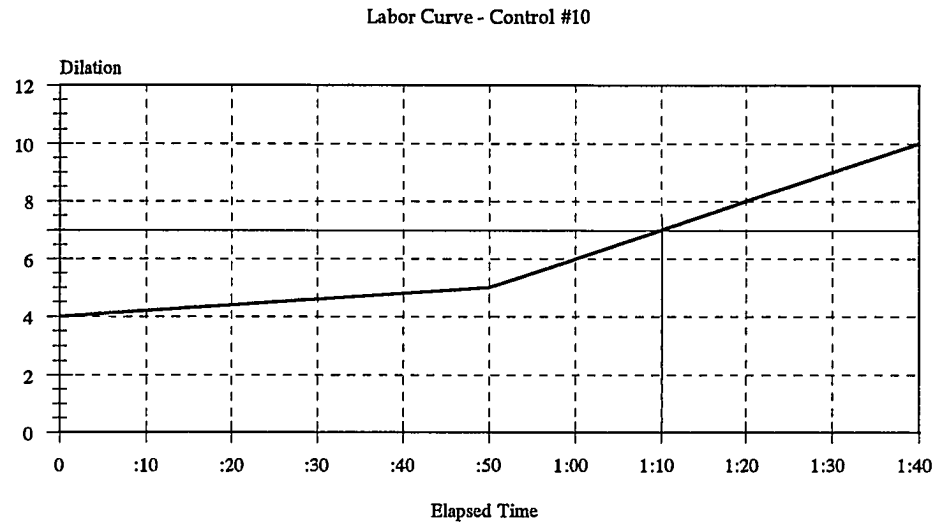


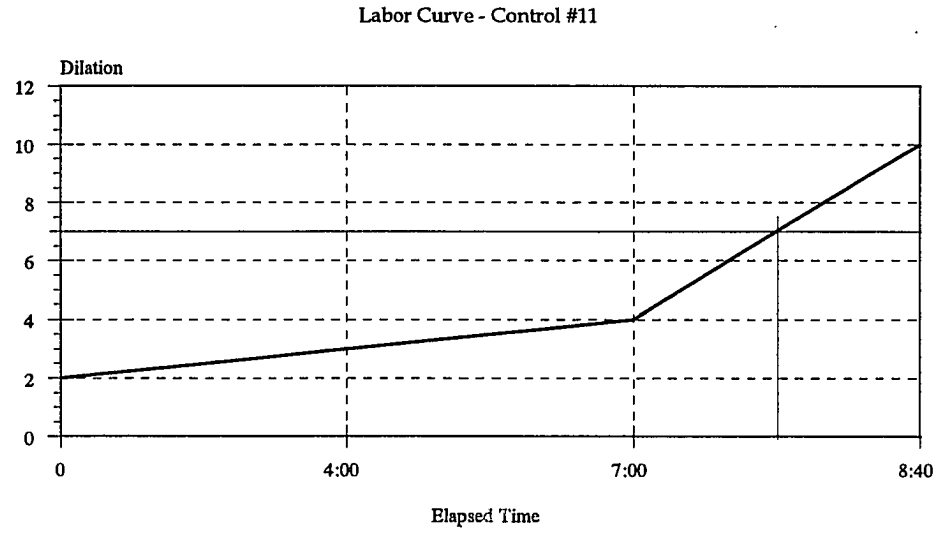
Labor Curve - Control #8



Labor Curve - Control #9

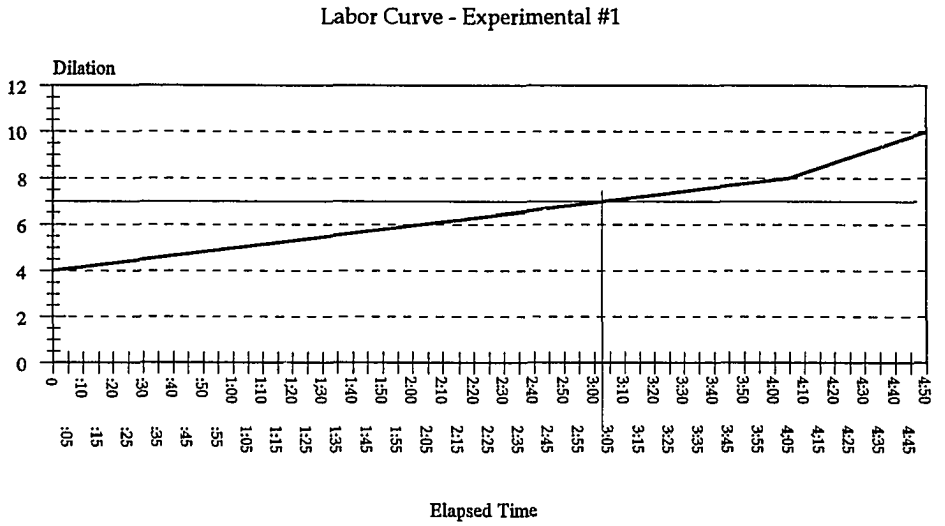




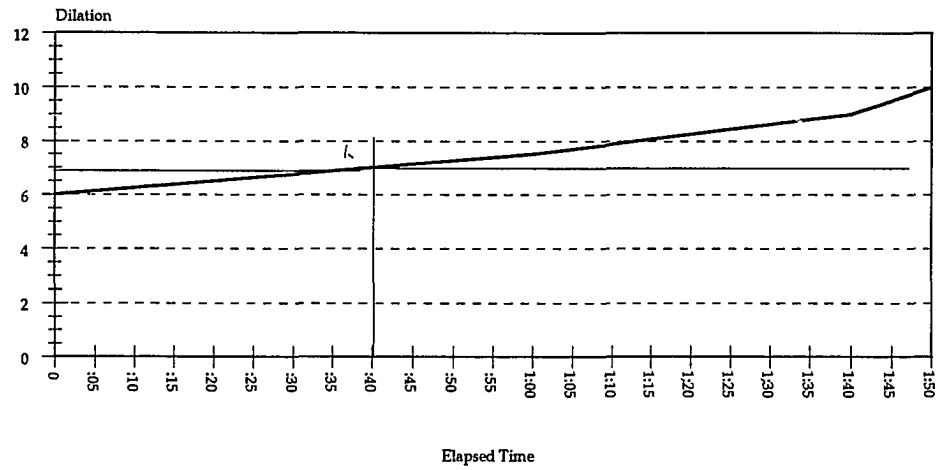


Appendix H

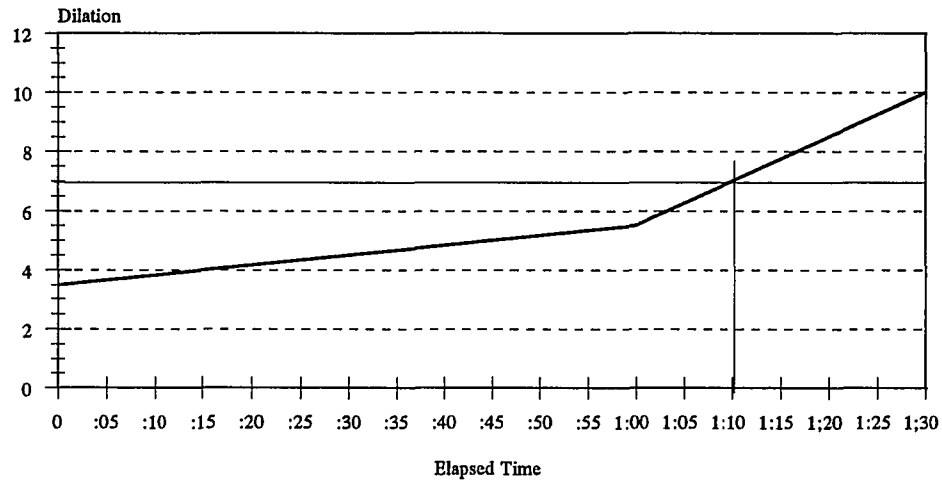
Experimental Group Time in Labor



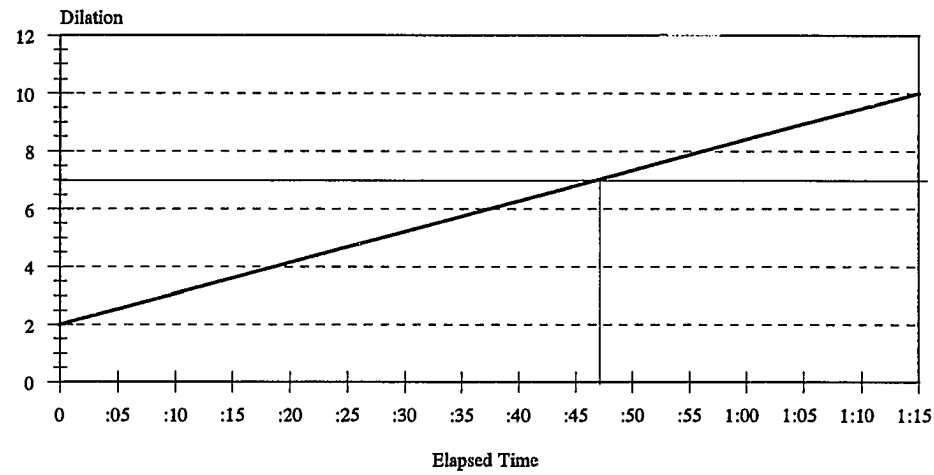
Labor Curve - Experimental #2



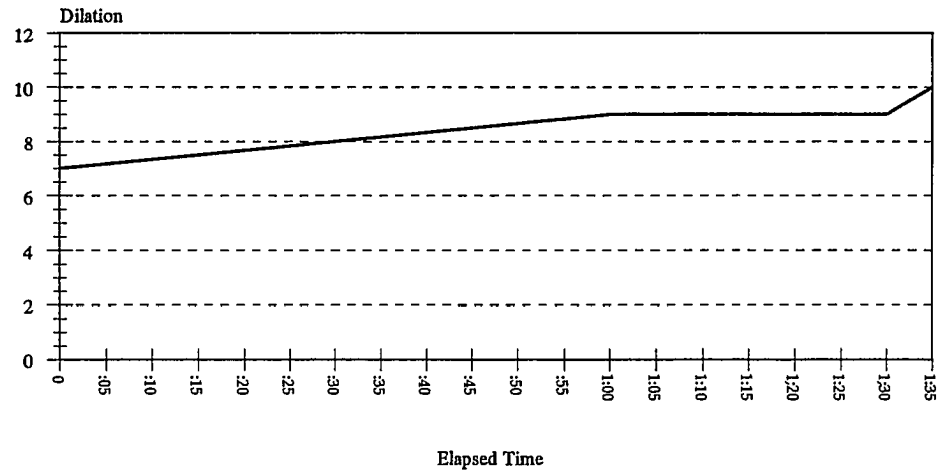
Labor Curve - Experimental #3



Labor Curve - Experimental #12



Labor Curve - Experimental #13



Labor Curve - Experiemental #14